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Global Information Society

Operating Information Systems in a Dynamic Global Business Environment

Yi-chen Lan

Global Information Society:
Operating Information Systems in a Dynamic Global Business Environment

Yi-chen Lan
University of Western Sydney, Australia

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Preface

In today's digital 21st century, almost all businesses face intense competition from competitors all around the globe. The rapid change of the global environment forces enterprises to seek suitable business strategies to sustain them in the competitive marketplace. This leads enterprises to change their existing ways of conducting and operating businesses, and transform themselves in a way that will enable them to cope with the global challenges, compete globally and eventually grow. The winners in this phenomenon are the companies that implement their business operations in the most creative and innovative manner possible. Needless to say, this is done through the incorporation of information technology (IT) into the business strategies and goals.

In the past few years, IT has been recognized as an imperative factor that drives companies toward global operations (Palvia, Palvia, & Whitworth, 2002). Moreover former U.S. President Bill Clinton (2002) also stated in his address at the University of California, Berkeley: "A world characterized not just by a global economy, but by a global information society. When I took the oath of office as president on January the 20th, 1993, there were only 50 sites on the World Wide Web in '93. When I left office, there were over 350 million and rising. Today they're probably somewhere around 500 million. There's never been anything like it." It has evidently indicated that the globalization process will not thrive without judicious exploitation of information technology. Consequently the key words that emerge in performing innovative business operations are "globalization" and "information technology."

Globalization is not merely conducting businesses outside of home regions or countries. It involves the coordination of business structure, functions, activities, units, and employees together with the incorporation of appropriate global strategies. In order to implement the global strategy, efficient operation and management of global information systems seem to be the imperative success factor.

The fact that businesses are speculating on the significance of globalization is not so much of an issue. However the global challenge has presented enterprises with new types of economic opportunities and threats. Accommodating

these opportunities and threats by means of operating the global information systems dynamically to provide senior executives making decisions accurate and prompt information is crucial for successful global business operations and is at the heart of this book.

This book addresses the importance of information technology management and issues in operating information systems in the global dynamic business environment. It embraces discussions of the global information technology theory, frameworks and IT architecture, discovery of global knowledge management, improvement of the global information systems development methodologies, and applications of the latest technologies, such as mobile technology and web services, in the global information systems development and operations.

The book is considered a collection of new ideas, the latest technology applications and experiences in the global information systems development and operations. It will significantly contribute to the academic, research, and corporate business communities.

By surveying the literature in related fields, most discussions have been focused on the management issues in developing and implementing global information systems. Nevertheless, there is a lack of apparent attention for applying the latest information technologies to enhance the performance of global information systems.

The book will document the technical and managerial aspects of global information systems and provide insights into how the latest information technologies such as intelligent agents, dynamic decision support systems, and mobile technology could be initiated and embedded to the global information systems.

The book will also address the architecture of an integrated supply chain in global business operations; what process improvement is required to implement global information systems; and how organizations handle knowledge generated from various information sources globally. The book is intended to convey a high-level understanding of managing and applying the latest information technology for global information systems operation. In this book we are particularly interested in exchanging concepts, new ideas, research results, experience, and other related issues that could contribute to the academic arena and also benefit the corporate business community.

Organization of the Book

The systematic presentation of chapters gives readers an organized structure of the material. It embodies research and experience reports from global researchers. Although the book is not formally divided into parts, each group of

related chapters has a different focus on global information systems development and operations. The book is organized into 13 chapters.

Chapter I defines the evolution and key indicators of the information society, which is being triggered by the Information Wave in the last 25 years. Several aspects of the information society will be reviewed and their developmental path will be defined. The fast development of the "global economy" is based on the information communication technology (ICT) supported by the information society. Depending on the different levels of national ICT development, different levels of complexity and influence are implied on the global economy. Hence it is imperative to recognize various development phases, solutions, and internal and external consequences of the information society. The key question appears to be whether the information society is a new tool of thought or a new way of life.

Chapter II highlights the problem of inefficiency of classical business systems in an era of dynamic changes of global business environment. By analyzing business models on the conceptual level, it is proven that business structures in classical business systems significantly influence the shaping and performing of business processes. The author concludes that a single business system reengineering project is not the definitive answer. In the global business environment, changes are constant. The efficiency of business processes can be maintained and increased in the long term only by constant but effortless adaptation of structures. This is possible by the introduction of the organizational structure without hierarchy and the mechanism for dynamic adaptation of structures to business processes. The model of "process organization" is described in the chapter.

Chapter III discusses the risks related to the organizational transformation process to globalization. This chapter aims at providing organizations that are considering the move to globalization with clear understanding of the entire transformation process and all the prerequisites for a successful transition. A full explanation of what is involved in the globalization process is at the start of the chapter, followed by a comprehensive investigation of the key success factors that may impact the process. Additionally the chapter discusses some of the common problems that might face management and workers during the globalization process. It is intended to provide detailed global transformation information to both managers and researchers for their use as the globalization guidelines.

Chapter IV presents how a medium-sized manufacturing organization transformed itself from a manual to an IT-based document transacting business process. This lesson in documents transaction helped the organization score large gains in productivity, in cost cutting, and in evolving a sound performance measurement system. However globalization also opened up opportunities and threats. The old system had sufficient IT backing but it failed in motivating employees

in adopting a global information challenge. In order to compete internationally through differentiated products with high quality, this firm then reengineered its manufacturing. Information from the market substituted quality as driver of information transactions. The goal of the project was to web-enable the firm. The IT project had to define business transactions as the unit, which would define transactions in information in object language first and subsequently as transactions in documents. Browser-enabled communication proved acceptable to employees who had previous learning in information transactions.

Chapter V investigates one of the major hindrances to the utilization of rapid evolution of information communication technology through global alliances, cross-cultural issues. While technology renders the geographical boundaries redundant, it aggrandizes the chasms in socio-cultural value systems of physically disparate alliance partners. This chapter first discusses the gamut of global e-business alliances: the primary reasons for their need, their socio-cultural perspective, and the various factors that influence such alliances. Secondly the corresponding mitigating approaches to those negatively influencing factors are suggested.

Chapter VI discusses concepts and characteristics of decision support methods and demonstrates the gap between the decision maker and the decision support systems techniques. It examines the experience of the government of Egypt in building its information infrastructure to help develop the decision-making process both at the government level as well as at the local public administration level.

Chapter VII proposes a framework for making decisions dynamically in a global organization. This framework enables data to be retrieved and analyzed dynamically with the aid of technology. The chapter starts with the discussion of various types of global organizations and departments within a global organization. It is followed by the investigation and identification of organizational data and decisions that make up the global organization; it also examines the different enabling technologies that can be applied for information retrieval. Finally the chapter concludes with a discussion of the proposed framework for making decisions dynamically in a global organization.

Chapter VIII is dedicated to the major managerial, organizational, and technological aspects of development of data warehouses in a global information environment, when different external sources of information are available and potentially may have value for decision support and managerial analysis. It summarizes the major benefits that become available for businesses if they decide to integrate information from external sources into their data warehouses. It also introduces the overall organizational framework of development of data warehouses that are based upon the information from different external sources.

Chapter IX explores the impact of web services in creating a paradigm shift in the way businesses strive to globalize. This fundamental shift in the paradigm of the globalization process occurs due to the fact that with web services, it is not one single organization that starts dealing with its clients electronically but, rather, a number of organizations (a cluster) with common needs and complimentary services that start dealing with each other electronically. Web services enable business applications to talk directly with each other without human intervention, resulting in rapid interactions amongst businesses at a global level.

Chapter X discusses quantitative modeling to introduce and manage new information technology successfully in global business operations. The mathematical models that involve conceptualization of the problem and its abstraction to a quantitative framework are the mina discussion of the chapter. Furthermore the dependent and the independent variables are identified and mathematical relationships are established between them. Results, analysis, and recommendations are discussed to conclude the chapter.

Chapter XI explores the concept of enterprise, or organizational mobility. The authors examine how mobility in a business can provide a competitive advantage and enhanced sustainability. Potential industry applications for mobile technology are discussed. The authors delve further by exploring the growth areas of mobile technologies and outline key success factors for the stakeholders in the mobile technology arena. The many opportunities mobile technology brings to various businesses are assessed. Furthermore the impacts of mobile technology on organizations and society are evaluated. The chapter concludes by outlining various competing mobile technologies available to the market both today and in the future.

Chapter XII reviews the components of e-business from a procurement perspective in order to explore the key value propositions of e-business practices in the global automotive industry. Using an exploratory case study of the automotive industry, the key questions for identifying a true value proposition of e-business are identified, including their e-procurement, e-catalog order processing, e-auction, and e-capacity systems. It is undisputed that e-business will bring at least some level of benefit to a vast majority of organizations, regardless of size or industry. This chapter intends to be valuable for evaluating and implementing a successful e-business strategy, structure, and solution.

Chapter XIII discusses how globalization in the publishing domain is achieved through global information and communication systems. Global information systems (GIS) enable not only integration of applications within an organization but also enable extensive connectivity between applications across varied platforms and software domains both within and outside the organization. This timely connectivity has created tremendous opportunities for the publishing industry — increasingly dependent on split-second timing to report news — to integrate

its business processes as well as devise new and innovative ways of collecting, assimilating, and disbursing information. This chapter is based on the experience of the lead author in one of Australia's largest publishing groups, John Fairfax Holdings Ltd.

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Chapter I

The Taxonomy of Information Societies

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Abstract

This chapter introduces the taxonomy of 14 information societies from the data society to the self-sustainable society: surviving members. Their essence and role in civilization is characterized and their paradigms and measurements are defined. The information society is considered as the force of change and a question is raised: is it a new tool of thought or a new way of life? The future trends of the information society are reviewed, and in conclusion there is a hope that the information society will make humankind more aware of its being.

Introduction

The purpose of this chapter is to define the evolution and key indicators of the information society, which is being triggered by the information wave in the last 25 years. Several aspects of the information society will be reviewed, and their developmental path will be defined. The fast development of the global economy,

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which is based on info-communication technology (ICT), is supported by the information society. Depending on the different levels of a given country's development, the information society has different levels of complexity and influence on the global economy and vice versa. Hence it is important to recognize the information society's different phases of development and their solutions and internal and external consequences. The question arises whether the information society is a new tool of thought or a new way of life. The answer to this question is provided by this chapter.

The Forces of Change

The "information society" is a fuzzy concept. It is considered the answer to the problems created by the postindustrial *modus operandi*. In a modern economy growth is owed to advances in info-communication technology. By the beginning of the 21st century, the need for information handling and processing in world societies is being shaped by the following trends:

1. Politics in the post-Cold War Era. A new world order may lead to the formation of 1,000 countries and a highly decentralized "international society." This physical disintegrational trend will require tools to integrate these entities informationally. Eventually this new system of nations will be based on a new info-communication infrastructure, which needs new info-communication systems and services.
2. Democratization and peacemaking. Societies would like to be better informed, therefore they need more communications based on free speech and solutions, like the Internet.
3. Globalizing information. This is caused by the proliferation of ICT and is a major driving force in the transnationalization of the world economy. Estabrooks (1988) predicts that programmed capitalism in a computer-mediated society will integrate all national markets and create one international market.
4. The globalizing economy. A network of 50 global corporations now "rule the world" because they apply the global information infrastructure. ICT is at the core of the current process of economic globalization (Madon, 1997).
5. Population growth and health threats. In 2025 there will be about 9 billion people, which will generate at least twice as many transactions as currently processed today. This means more needs for the ICT capacity.

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6. Global environmental threats. If these threats are considered seriously, then there is a need for planetary management and ecology. This new management and ecology will require more monitoring info-communication systems and services.
7. A new path for development. Since the gap between rich and poor nations continues to widen, a world focused on people is being created. This undertaking requires new concepts of human security, new models of sustainable human development, new partnerships between state and market, new patterns of national and global governance, and new forms of international corporations (Boutros-Ghali, 1994). This trend requires more education and research, which will necessitate the formation of "knowledge" and "learning" societies (Marien, 1995).

As society, particularly the information society, becomes more interconnected, we face a loss of boundaries, throwing into question the basic conceptual distinctions we use to make sense of the world. As society becomes more complex and takes on more variety and configurations, the capacity of existing regulatory (governance) systems is being overwhelmed. A group of 14 Canadian public servants offered the following new focus for how to govern in the information society (Rossel, 1992):

- Information-based ways of organizing to include more players to innovate and learn.
- Forging consensus.
- Strategic use of information to provide leadership in the continuing process of learning.

For example, the Japanese information society's purpose is the transformation of *homo sapiens* into *homo intelligens* in the spirit of globalism through transparent networks and an open educational system. This purpose pretends that anyone, anywhere, at anytime in Japan should be able to easily, quickly, and inexpensively get any information. We see these premises treat the information society as "computopia" and as a rebirth of technological synergism (Masuda, 1971). Perhaps we expect too much from the information society, which can provide "computopian" platforms for info-communications but does not necessarily mean that people will use them.

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The Information Society: A New Tool of Thought or a New Way of Life?

The impact of info-communication technology on individuals and organizations has been analyzed under the rubric of the information society since the beginning of the computer revolution in the 1960s (Masuda, 1971; Bell, 1973). It is a socio-economic view of the impact of computers on society in general. The increasing role of computer and network applications affect almost every facet of human life. Sociologists and computer pioneers tried to rationalize the computer's role in society.

The term "information society" was applied for the first time by Koyama in 1968 and subsequently by his compatriot Masuda in 1971 in his master plan of building the Japanese information society. The "information society" evolved from such slogans in the 1960s as computer-serviced society (Sackman, 1967) and in the 1970s as the age of cybernetics, information era (McLuhan, 1968), knowledge society (Drucker, 1968), technotronic society (Brzezinski, 1971), computer revolution, wired society (Martin, 1978), telematic society (Martin, 1981), post-industrial society (Bell, 1973), and Gutenberg two (Godfred & Parkhill, 1979). The "information society" was coined in order to intellectualize the change in social behavior that transformed capitalism with "capital and material" into a new political and social order based on "information."

In Eastern Europe, specifically Poland, these ideas were almost implemented in 1971-1974 under the form of a national information system whose purpose was to transform a totalitarian society into an informed society (Targowski, 1991). A similar project, though only a tool of central planning, was a subject of experimentation in Chile. President Allende invited famous British cybernetician Stanford Beer to apply his ideas of feedback to reduce planning complexity, but the assassination of the president also killed the cybernetic society in South America.

Pawlowska (1992) offers the following five characteristics of the information society, which are agreed upon by most authors:

1. Information materialism — information as an economic good that can be sold, bought, and possessed.
2. Widely applied information technology.
3. Integration of different types of information technology.
4. A national economy dominated by the information sector (information economy).
5. Special status of knowledge.

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The information society, with its information economy, occurred as a result of industrial evolution rather than resulting from the information revolution. Although it is the same capitalistic society with the same values, the focus on information increases human cognition and changes the future of mankind and its environment, particularly its infrastructures, and perhaps brings along a change in societal values. The information society requires that the human process of cognition is no longer limited to reductionism, mechanism, and analysis. The process in this new society can be more open, more expansive in generating ideas and solutions channeled by a better focus (aims) and synthesis of system thinking.

The strong development of media in the information society, particularly interactive ICT, facilitates the communication of one's message. It may lead toward participative democracy, which should assure an equal access to power and the right to decide one's fate. These are the new values that can be implemented in the information society.

Sociologists perceive the information society as a dream society of idealistic values and clean hands not involved in the "dirty" material economy. Is it realistic to expect so much from the information society or even think that such a society can exist? The answer is no. The post-industrial economy, also known as the service or information economy, has been reduced by Daniel Bell (1973) to the economy of the elite (lawyers, financiers, and researchers). Such an economy cannot sustain the national economy in the long-term since it exports "jobs" and disharmonizes the development of a mature economy.

A narrow interpretation of the information society as a culture based on information materialism makes the concept of the information society more of an unfulfilled, even misleading, premise and science fiction. However if the information society is conceived as a tool of making more informed, knowledgeable, and wise decisions, then such a society can pass a reality check and its development should be supported. Such a society has the chance of becoming the "conscious society" on the way to developing into the "wise society," driven not only by information and knowledge but also by the wisdom of how to survive and be satisfied.

If the information society applies electronic mail, telecommuting, electronic commerce, and/or distance learning on a wide scale, then these technologies lead to new ways of human behavior in civilization.

The politics of information should also be as important as "computer literacy." We pay a lot of attention to applying computer tools, but do we scrutinize the application systems' design and operations of the information society? This lack of application design checks may lead to the abuse of social activities, and ICT may become unwanted technology.

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The Essence of the Information Society

The social framework of the information society defined by Bell (1979) is a new integrated computer-telecomunication infrastructure that transmits structured facts, ideas, judgments, or experimental results. Bell's view that technology is the main agent of change has been questioned by several authors; for example, John McCarthy (1979) argues that the new technology is not the main cause of change in our society today. On the other hand Bell, perhaps, thinks the same way when referring to Machulp (1962) and Porat's (1979) thesis that the information society is defined by the proportion of information/knowledge activities to material ones. If the latter activities are greater than the former, then the information sector becomes the primary one (information products and services) with another two deviated information sectors (public and private bureaucracies). The three remaining sectors are: the private productive (producing goods), public productive (building roads, dams, and so on), and household sectors.

Beninger (1986) hypothesizes that the information society is the answer to the control crisis, caused by the Industrial Revolution. Hence he concludes that "control" is the engine of the information society.

Where are the real roots of the information society? They are in the concept of "information" rather than in "material control." Information is a process of forming a new idea, concept, event, material, energy, product, service, and so on. By forming some idea or description we inform it. This meaning is called "to inform." Peters (1987) argues that with the decline of scholasticism and the rise of empiricism around the 17th century (the rise of natural sciences), information gradually came to refer to "the information of senses" (such formulations are found in Bacon, Locke, Berkley, and others). Once information referred to the defining of universals; nowadays it also describes the processing of particulars (data, information, concept, knowledge, wisdom).

Instead of defining the information society by its dominant product, information, we perceive the information society through its general structure of social and economic relations.

An investigation of the general structure of social and economic relations must lead to the analysis of civilization. Civilization is an info-material structure developed by humans to effectively cope with themselves, nature, and their creator. The mission of civilization is to improve human existence. The civilization model (Figure 1) has the following components:

- Human entity – organized humans
- Culture – a value-driven process of developing patterns of human behavior

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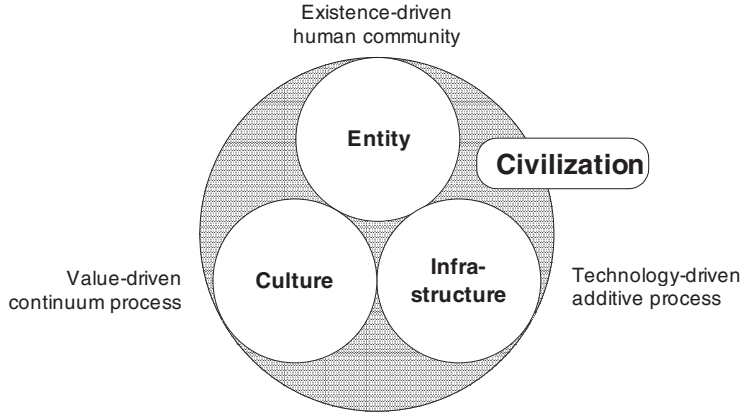
- Infrastructure – technology-driven additive process of acquiring and applying material means

A human entity in the political sense is a family, tribe, ethnos, people, proto-nation, nation, international community, global society, and so forth. A society is an organized human entity on the same territory in order:

- to support their own existence through the exchange of specialized services and goods via infrastructures; and
- to develop the human race by the development of culture and infrastructures.

The role of a society in a civilization context must take into account the stage of civilization development. The first civilizations (Mesopotamian, Egyptian, Minoan, Indus) were societal civilizations that organized society. Based on this civilization the next civilizations (Hellenic, Roman, Sinic, Japanese, Buddhist, Islamic, Eastern, Western, Sub-Saharan, and Maghrebian in B.C. times) were organized around cultural issues. Hence we can call them cultural civilizations. The third generation of civilizations (Japanese, Buddhist, Sinic, Hindu, Islamic, Eastern, Western, and African in A.D. times) are organized around the issues of developing infrastructures, therefore we will name them the infrastructural civilizations.

Figure 1. A model of civilization (The Targowski Model)



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Among civilization infrastructures, one can recognize the following configurations:

1. Core infrastructure (authority I., economic I., military I.)
2. Foundational infrastructures (urban I., rural I., health I.)
3. Integrational infrastructures (transportation I., knowledge I., communication I., information I.)

Does the level of development in a society depend on the era in which the civilization existed? Although all eight civilizations developed infrastructures, each one put a different emphasis on a particular category of an infrastructure. Most literature describes the societal development in Western civilization. In fact, its emphasis is on the integrational infrastructure that is being developed for the purpose of pursuing the culture of management, media, education, and entertainment as well as strengthening the economic, military, and health infrastructures. Of course societies from other civilizations have different priorities.

The Western societies develop the integrational infrastructure not for the sake of infrastructure but for the purpose of developing the aforementioned cultures. In other words an information society emerges when a society's purpose and primary means of solving problems are focused on information handling and processing.

For example, the level of ICT advancement in both the United States and Singapore are at a high level. However the proportion of information to material activities in the U.S. is much higher than in Singapore, the hub for manufacturing American goods. Does it mean that there is not an information society in Singapore? Singapore is an automated state-city with some solutions that are not conceivable in the U.S. Are both states at the level of an information society? Certainly not; these societies require further differentiation. At this moment we may say that the U.S. enters the "informed" society level while Singapore is at the level of "informative" society.

Alvin Toffler (1980) offered a very elegant concept of civilization development through three waves of agriculture, industry, and information. However later Alvin and Heidi Toffler (1994) became advocates of the "new civilization" because they perceived the information wave as replacing the agricultural and industrial waves. Is bread being replaced by Windows XP or a car by the Internet? It will not happen. The next wave includes the previous ones as illustrated in Figure 2. The quality of any information society depends on the quality of the previous societies. In other words the information society is not autonomous, it is rather inclusive. The relationships among these societies determine the quality of life in the information society.

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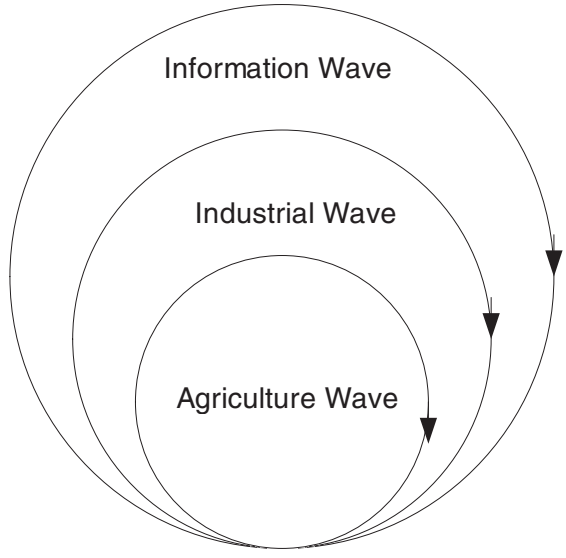
Figure 2. The inclusiveness of civilization wave (The Targowski Model)



The Types of the Information Society

The term "the information society" was good enough when it was first described 30 years ago. Nowadays the information society is being developed in several mutations. The types of information society are:

The Data (Dossier) Society: A Big Brother Control

The Industrial Revolution made it possible to "process" materials such as coal, metal, and textile at unprecedented volumes and speeds. Such acceleration of material processing increased the demand for control of industrial operations. For instance, the many problems of scheduling and coordinating in the early days of the railroads resulted in missed connections or accidents. According to Beniger (1986), the control revolution is a watershed transformation in capacities of "information processing," as the Industrial Revolution was in material processing.

The control revolution created punched cards machines in the 19th century and computers in the 20th century. Almost the first 100 years of mediated informa-

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tion processing was involved in data processing for the purpose of accounting and management. As the Industrial Revolution marked the discontinuity of coupling energy, data processing played the same role by exploiting business data/information. The emergence of information processing equipment, whether punched cards or computers, led to the development of transaction processing and later in the 1970s to on line transaction processing applications (OLTP).

With computers quickly becoming *modus operandi* of government and business, a number of questions arose. How do they fit into the political landscape? How are they designed and implemented? How are ethical and policy judgments made? The dossier society defined by Laudon (1986) places computers in the context of the Constitution.

The genius of American politics is its balance more in favor of individual freedom and diversity than organizational demands for control and efficiency. Contemporary ICT can radically alter the organization of power in the United States and with it our traditional conceptions and experiences of individual freedom, security, and privacy. The other side of the data society is a "dossier society." According to Kenneth Laudon, from a technical point of view, the dossier society is the integration of distinct files serving unique programs and policies into a more or less permanent national database. It may lead to an aggregation of power in the federal, state, and local government without precedent in peacetime America. The dossier (data) society can expose the life of an individual to governmental screening and composite analysis that can be analytically "right" but is not reflective of the reality of the individual's life. Even if the analytical screening is right, may the government penetrate the privacy of the individual? Do we not have the right to shadow some of our citizens' lives?

Most Americans want a society where criminals are effectively brought to justice. Most Americans want a society where government programs are effectively and efficiently administered using, where necessary, advanced ICT. Power is limited by segmental authority, segregation of information flows, creation of multiple checkpoints, and encouragement of lengthy and slow deliberation. These practical principles are at odds with the capabilities and premises of contemporary ICT applications.

In 1984 Congress signaled a virtual retreat from the Privacy Act by passing the Deficit Reduction Act of 1984, which contained provisions establishing a de facto National Data Center capability. Congress required all states to participate in file merging, matching, and linking programs to verify the eligibility of beneficiaries in food stamps, Medicare, Aid to Families with Dependent Children (AFDC), and a host of other "needs" and insurance-based programs. Involved here is the systematic merging and linking of Social Security, medical, and personal data with Internal Revenue and private employer data. These "matching" and "linking" programs are "limited" to about 50 million Americans (Laudon

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1986). There are no technical barriers to extend them to corporations like Ford, CitiBank, Coca-Cola, Kellogg, or the American Medical Association and other professional interest groups. Then the dossier society will become a reality.

The Computer Society: A New Social Tool

In the 1960s the evolution of computer applications progressed from mathematical computation to information processing and even to real-time control. Computers increasingly catalyze the growth of scientific information and human control through computer-aided system development. By the end of the 1960s, with the development of online terminals, computer access had been broadening along with the idea of the computer-serviced society. The emergence of the computer society was a result of social information systems. The trend of these applications was charted through three stages: human information systems (libraries), industrialized man-machine systems (factories), and man-machine digital systems (online banking). The first stage corresponds to primitive and underdeveloped societies, the second to the advent of machines operated through controlled power, prominent through the first Industrial Revolution, and the third to the progressive computerization of advanced industrialized societies since World War II. The computer society was then projected as a possible new utopia, destined for oblivion or success in proportion to man's capability to chart and control his own evolution (Sackman, 1967).

From today's point of view the computer society is mostly preoccupied with the issue of how to apply computers. This issue was particularly popular in the United States in the 1980s with the advent of personal computers. This issue is still popular in developing and less developed nations that are at the early stage of computer literacy.

The Informative Society: A Way of Processing Information

A composition of the data-dossier society, industrial society, and computer society features create the informative society. The informative society transforms the way business, government, and citizens work. It is helping organizations get leaner, smarter, and closer to the customer. Those who seize the opportunities inherent in this revolution are capturing important competitive advantages. Those who lag behind are forced to scramble breathlessly in the race to catch up.

The informative society is the result of the merged data and computer societies based upon advanced software such as on line analytical processing. OLAP software such as data warehousing and mining transforms OLAP into value-

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added information. In the mid-1990s data warehousing became one of the buzzwords of the ICT industry. However it was invented by real companies to make use of vast volumes of databases. From 1965-1999 almost every aspect of data processing had been automated in the name of efficiency. With the increased power of ICT more complex systems could be implemented. For example, from simple bookkeeping applications, the banking industry moved to ubiquitous automated teller machines (ATM), which can provide a good base for customer behavior analysis and further the development of relation banking.

In the 1990s IBM evaluated how to move from a computer-based business to managing a business based on information. This led to the concept of data mining in order to extract a new value of information in the business context. The solution to this quest is data warehousing software, which is a single, complete, and consistent store of data from internal and external sources delivered to end-users who can process data into information in the business context (Devlin 1997).

Informative systems was defined by Zuboff (1988) in her popular book *In The Age of The Smart Machine*. *The Smart Machine* is applied to transform the nature of work and can provide negative (alienation) and positive (empowerment) results. However that same technology may "informate," empowering ordinary working people with a broad knowledge of the production/service process, making them capable of critical judgment about production/service. The author argues that systems should be informated rather than automated.

The informative society is a community of developers and users who understand what data/information to process in order to achieve added value in decision-making, either at the personal or organizational level. This elite community, which is no longer in the computer society, struggles with the issue of how to apply Windows XP or a scanner. Members of the informative society are better informed than members of the previous societies, since they use meaningful information in a given context instead of merely applying data to decision-making.

The Networked Society: A New Social Superconnectivity

In the networked society, home computers are as common as the telephone. These electronic appliances link people to people, shrinking time and distance barriers among them and nearly eliminating those barriers between people and information. In its simplest form the networked society is a place where thoughts are exchanged easily and democratically and intellect affords more personal power than a pleasing appearance does. In *The Network Nation* Hiltz and Turoff (1993) write: "The Network Nation or Society is a collection of communities with overlapping networks for actual and potential communication and

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exchange. We will become the Network Nation, exchanging vast amounts of both information and social communications with colleagues, friends, and 'strangers' who are spread out all over the nation and share similar interests, Ultimately, as communication satellites and international packet-switching networks reach out to other cities and villages around the world, these social networks, facilitated by computer-mediated communications, will become international; we will become a 'global village' whose boundaries are demarcated only by the political decisions of those governments that choose not to become part of an international communication."

The networked infrastructure can be utilized to substitute for the use of limited physical resources. In the 21st century we will probably see:

- Increased scale and distinction of community-oriented networks for academia, government, business, politics, social aspects, and other purposes.
- A variety of virtual educational institutions.
- "Networked" organizations with flatter, more consolidated, and connected structures of firms, and changes in the nature of work ("End of Job").
- The integration of ICT resulting in "superconnectivity" for all those users with an access to networks.

The network society applies ICT to produce a culture and systems supporting service-material base. Analyzing the potential for conflict among new information and communications opportunities, one can identify five major areas in which public policy issues are likely to arise [1]:

1. Equitable access to information and communications opportunities.
2. Security and the survivability of the network infrastructure.
3. Interoperability of the network infrastructure.
4. Modernization and technological development of the network infrastructure.
5. Jurisdiction in formulating and implementing national information policy.

The network society operates in a cyberspace, which is a new social space, shaping networks into "networlds," the global matrix of minds stipulated by interconnected computer networks. Komito (1998) perceives the following categories of the networked society: moral, normative, and proximate communities. These communities are generated by the networked society, which becomes a foraging society of flexible communities.

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Network diffusion modifies the operation and outcomes of trade (*e-commerce*), production (*computer integrated manufacturing*), experience (*end user computing*), power (e-republic), and culture (*icons*). Castells (1996) argues that presence or absence in the network society and the dynamics of each network *vis-a-vis* others are critical sources of domination and change in our society; a society that is characterized by the preeminence of social structure over social action. In other words the power of flows takes precedence over the flows of power.

The Mass Media Society: Provided Consciousness

The term mass media means communication by the media such as television, radio, newspapers, and books. The most distinguished characteristic of mass media communication is that it is mostly one-way. To attract as large an audience as possible, the media are addressed to the largest number of people, very often at the lowest denominator.

Since the advent of television, mass media created the mass media society, which is stimulated by the media as informers, interpreters, persuaders, entertainers. The mass media democratic society is strongly influenced by the media that becomes the fourth power, after the executive, legislative, and judicial branches of governance.

Today in developed nations electronic voting and opinion-registering technologies make a two-way flow of what was once a one-way pipeline, with information no longer going just from the top down, from lawmakers to people, but now also from the bottom up, from the people back to the lawmakers. A new political system is emerging as the mass media society enters the electronic republic status (Grossman 1995).

America is turning to an electronic republic, a democratic system that is vastly increasing the people's day-to-day influence on the decisions of the state. This transformation is triggered by the remarkable convergence of television, telephone, satellites, cable, and personal computers. The electronic mass society is heading from participative democracy toward direct democracy, a form that originated in the fifth century B.C. in small, self-contained Greece. At the beginning of the 21st century, in democratic nations, the electronic mass media society is transforming an isolated citizen into an electronic citizen who feels that his/her vote may have some meaning in pursuing the common good.

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The Virtual Society: Anyone, Anywhere, Anytime

The virtual society is a community that operates in cyberspace, generated by computer networks, software, e-files, and interactive dialogues among the participants. The virtual society's members interact among themselves without physical presence and interact with organizations that are digital. Virtual corporations, communities (for example, WELL in San Francisco), shops, schools, and agencies broaden and intensify the social and business interactions of the virtual society. Agres, Edberg, and Igbaria (1998) argue that the "virtual" empowers an individual who can easily interact within the digital environment. The individual can be electronically present in more digital places than he/she could manage to be in the same range of physical localities. The virtual society's members are better communicated and informed. Virtual cyberspace may enhance job performance and training, improve product design, assist surgeons, and create interactive forms of entertainment. But it will be years before that becomes a reality, if it ever happens at all.

The Communicated Society: Familiarity of Events and Facts

The application and dissemination of omnipotent ICT may transform the United States, Western Europe, and Japan into a "technopoly," which has sovereignty over social institutions and national life and becomes self-justifying, self-perpetuating, and omnipresent. Postman (1992) traces the historical movement of technology from a support system for a culture's traditions to competing with them, and, finally, to creating a totalitarian order with no use for tradition at all. However, with strong insistence on the value of free speech, ICT may make citizens better informed. Of course to do so, the communicated society should pass the stages of mass media, networks, and virtual societies.

The Informed Society: Awarded Members

The informed society is formed when the informative and communicated societies achieved the status of mature entities. The informed society's members are characterized by a good level of awareness and sense of what is going on in the society and the economy. The members of such a society can make wise decisions based on their own judgment, which is supported by data mining technologies as well as networked and enterprise-wide systems and services. This society is a computerized society at the level of social sophistication and finesse.

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The Robotized Society: Automated Judgment

The robotized society is composed of robots, even thinking robots. These robots' behavior is based on the rules of artificial intelligence. Robots may not be the best of musicians, but they can be used for testing instruments as if they are manufacturers. If we are to use robots on a wide scale, and if technological advances toward the "thinking" computer continue, it will become necessary to lay down guidelines governing where and how they are used. Isaac Asimov proposes Three Laws of Robotics:

1. A robot may not injure a human being or, through inaction, allow a human being to come to harm.
2. A robot must obey the orders given to it by human beings except where such orders would conflict with the first law.
3. A robot must protect its own existence as long as such protection does not conflict with the first or second laws.

Robots in the real word do not look a bit like some of the robots we have grown used to in films and stories. But they are still extraordinary devices and far cleverer than machines of earlier times Asimov (1985). The robots do not pay taxes and therefore on a broad range of applications they may cause unemployment and a demand for highly skillful workers. On the other hand if they are applied in very complex systems and prove to be highly reliable, then their applications can be useful and recommended.

The Knowledge Society: Understanding Members

In *Post-Capitalistic Society,* Peter Drucker (1993) describes how every few hundred years a sharp transformation has taken place and greatly affected society — its worldview, its basic values, its business and economics, and its social and political structure. According to Drucker, we are right in the middle of another time of radical change, from the age of capitalism and the nation-state to a knowledge society and a society of organizations. The primary resource in the post-capitalistic society will be knowledge and the leading social groups will be "knowledge workers." The industries that moved into the center of the economy from 1958 to 1998 have as their business the production and distribution of knowledge and information rather than the production and distribution of things. Microsoft's market value exceeds the market value of three big carmakers, General Motors, Ford, and Chrysler. Why? Microsoft employs only 50,000

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workers, but they produce $400,000 per capita per year. Their knowledge is so costly. The super-rich of old capitalism were the 19th-century steel barons like Andrew Carnegie, robber barons like Jay Gould, oil barons like John Rockefeller, and transportation barons like Cornelius Vanderbilt. The super-rich of the knowledge society are computer makers (Steve Wozniak, Steve Jobs), software makers (Bill Gates), systems developers (Ross Perot), and others.

Knowledge becomes an economic resource and a tool of genuine innovations that provide a competitive advantage in business. Knowledge is a set of rules, laws and their systems that communicate by information handling and processing. The major driver of the development of a knowledge society is a demand for innovations in the marketplace and lifelong learning, which require permanently improving work conditions and demand higher productivity and effectiveness.

The knowledge society applies tools needed for problem solving. Among these tools one can mention high-speed computers, information retrieval services, and networks of talent groups.

The Learning Society: Developing Members

The development of the knowledge society requires constant discovery, assimilation, and organization of knowledge. These processes constitute learning activities, which at the beginning of the 21st century requires skillfully swimming in the ocean of information, artfully using information-rich sources, and using a supportive learning environment to self-pace and self-structure users' own programs of learning. The learning society gets its major input from higher education and provides its output to employers (MacFarlane, 1998).

The learning society is created not only by higher education institutions but also by "learning organizations" in business, industry, government, and nonprofit units. "Learning organizations" overcome learning disabilities to clearly understand threats and recognize new opportunities. Not only is the learning organization a new source of competitive advantage, it also offers a marvelously empowering approach to work, one that promises that, as Archimedes put it, "with a lever long enough ... single-handed I can move the world" (Senge, 1990).

The paradigm of the learning society is understanding, and its purpose is to strengthen human planning and behavior in complex environments, such as the modern global economy, steered by the new world order and often unclear to many people.

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The Global Open Society: Justice for Whole Planet

As a result of learning, people and their governments who promote a global economy may try to create a formal, global, and open society. The global economy is based on free movement of goods, services, capital, and ideas. The globalization of financial markets means that the movement of exchange rates, interest rates, and stock prices in various countries are intimately interconnected. Global integration has brought the benefits of the international division of labor, economies of scale, and the rapid spread of innovations from one country to another. However the global economy is the global capitalistic system, which is not without problems as Soros (1998) writes in his quest for the global open society.

The organization of the global open society is needed because such a society must regulate deficiencies in the global capitalistic system. Among these deficiencies, Soros lists the following: the uneven distribution of benefits, the instability of the financial system, the threat of global monopolies and oligopolies, the ambiguous role of the state, and the question of values and social cohesion. Since global markets reduce everything to commodities, we can have a market economy but we cannot have a market society. Globalization increases the demands on the state to provide social nets while reducing its ability to do so. This sows seeds of social conflict. This may lead to a new wave of protectionism and the breakdown of the capitalistic system, as happened in the 1930s.To prevent the next breakdown of the capitalistic system, one must organize the global open society, which is governed by the rule of law: respect for human rights, respect for diversity, respect for minorities and minority opinions, division of power, and a market economy. Of course the global open society is a society organized around information and by networks. This society requires many alliances (including virtual) that will establish a code for international patterns of expected behavior. Such alliances will apply information and computerized networks to disseminate and enforce these standards. Some such alliances are the World Trade Organization, North Atlantic Treaty Organisation (NATO), and the World Tribunal. Unfortunately the United Nations is an organization designed only for peace keeping not for planet management. This global society should be open. According to its promoter, George Soros, this means that it should be based on democratic principles and global justice for all habitants and their natural surroundings.

The Self-Sustainable Society: Surviving Members

The death triangle of mankind composed of the expected bombs in population (2050), ecology (2050), and resource depletion (2300), is two generations away

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from the generation of 2000 *anno domini*. The next 50 years (2000-2050) are crucial for the survival of mankind. If we look back into the last 50 years, we see that this period passed quickly and produced positive results never known in world history. It also created the threat "to be or not to be" for humans on Earth. The next 50 years is just a period of two generations. If we miss these generations, we also will miss the opportunity to educate these generations, and we will be overwhelmed by the complexity of the coming crisis and probable failure of human civilization. Although people, cultures, and nations have done this for centuries, the death triangle of mankind has never been so close to us.

A new society with new politics should be defined in the first part of the 21st century and implemented in 2025-2050 of the same century. Otherwise mankind may disappear from the Earth. The targets for the 21st century can be defined as follow:

- To achieve sustainable and diversified culture.
- To achieve mass consumption of green products from regenerative food and fiber systems through biodiversity (Dalhberg, 1993).
- To achieve these targets through the development of the nonmaterial society (value-driven) and self-sustainable society (survival-oriented).

The modern scourges of Western civilization, such as youth suicide, drug abuse, and crime, are usually explained in personal, social, and economic terms: unemployment, poverty, child abuse, family breakdown, and so on. However the author suggests that these trends are to certain degree independent of such factors. These curses are rather caused by a failure to provide a sense of meaning, belonging, and purpose in our lives, as well as a framework of values. People need to have something to believe in and live for, to feel they are a part of a community, a valued member of society, and to have a sense of spiritual fulfillment — that is, a sense of relatedness and connectedness to the world and the universe in which they exist.

The self-sustainable society should be the next step in social development. It should provide an orientation on values (for example, family), norms and attitudes, and the spiritual life. In other words we have to reinvent culture in such a way that it will be sustainable. Moller (1993) argues for the need to emphasize an input from different cultures in order to amalgamate a single concept for all of us. This transformation can be achieved if the learning and global open societies form a mature mankind.

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The Monitoring Society: Limited Communication

If we will not secure feeding and caring for the 10 billion people who are likely to be alive within a couple generations, then we have to secure the minimal means of social communication. It can be organized through the application of satellites or by primitive monitoring by the sound of tam-tam drums. Such an environment will be managed by the monitoring society, which will be very limited in technology and other resources. It may be the beginning of the end of mankind.

Table 1. The paradigms and measurements of information societies

IS Type	Paradigm	Purpose	Main Information Solution	Measures Per 1,000 population
Data (Dossier)	Measurement	Reduction	Mechanization and Automation, Off-line systems	Number of data entry personnel
Computer	Measurement	Reduction	Automation and How to compute? Off-line systems	Number of computers
Mass Media	News	Dissemination	Printing	Number of newspapers and Number of TV sets
Networked	Connection	Exchange	Internet, Intranet Networked enterprise	Number of Internet Users, Number of Intranet servers
Virtual	Electronic presence	Exchange and Opinion	Internet, Intranet Virtual enterprise systems	Number of bulletin board systems (national and organizational)
Informative	Optimization	Decision-making	What to process? Data mining Online systems Application Portfolio	Number of OLAP software per organization, % of GDP spent on IM, % of I-workers in the labor force
Communicate	Familiarity	Planning	Networking Online systems Networked enterprise	Number of Internet users, Number of telephones, Number of TV sets and Number of newspapers, % of GDP spent on telecomm.
Knowledge	Rules	Understanding	Research, education Information retrieval	Number of scientists Number of professors, Number of students
Robotized	Rules	Decision-making	Automation of judgment	Number of expert systems
Informed	Awareness	Decision-making	Data mining Networking Enterprise-wide systems	Number of OLAP software, and Mass Media and Network Indexes, Free press
Learning	Understanding	Planning and acting	Computer-aided instruction, Information retrieval Digital library	Number of published books, Number of digital books and scientific documents
Global	Justice	Operations	Virtual government Global systems	Number of applied virtual global agencies
Self-sustainable	Optimization	Survival	Green economy Ecological systems	Amount of energy from renewable sources
Monitoring	Warning	Survival	Satellites or tam-tam drums	Number of served people

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The Paradigms and Measurements

The issue of how to measure the information society preoccupies the research of several authors. Measurements of the information economy were offered by the previously mentioned authors, Machulp (1962) and Porat (1979). Hudson and Leung (1988) applied Porat's method to measure the information society of Texas. The Jahoda Index (Ito, 1981) applied by Japan's Research Institute of Telecommunications and Economics (RITE) has 10 components, which do not even include such words as computers, software, or networks. The index is almost 20 years old and does not reflect the ICT and IM solutions that are fruits of the information age and telecommunications age. About five years later, the Japanese Information Processing and Development Center offered the JIPIDEC Index. This index applies to such categories as hardware, software, and transmission.

Do these measurements define the information society (Dordick & Wang, 1993)? To answer this question, a new set of measuring indexes has been offered in Table 1. These measurements are from the citizen's (user's) point of view and explore how ICT penetrates the population and what type of paradigm, purpose, and main solutions are provided by each type of information society.

Of course the information society can be perceived at different levels of the population. The most popular level is a nation; however, one can analyze the information society at the level of a region or city as well as at the level of an organization. In other words in the same nation there can operate different types of information societies, as well as in the same, large organization.

The Developmental Paths of Information Societies: Future Trends

The developmental paths of information societies are presented in Figure 3. The model is self-explanatory with the exception of the expert society. The main idea of the model is based on the prerequisites required in order to move to the next developmental stage. For example, the informed society can launch its operations if its members pass through the stage of the informative and communicated societies. The application of artificial intelligence may help in many areas of civilization; however, it requires advanced knowledge among developers and limited skills among operators of expert systems. Therefore, too many applications of robot systems may lead backward to the computer society, where the main challenge is how to apply the system. On the other hand some limited applications of expert systems in technological environments that are too

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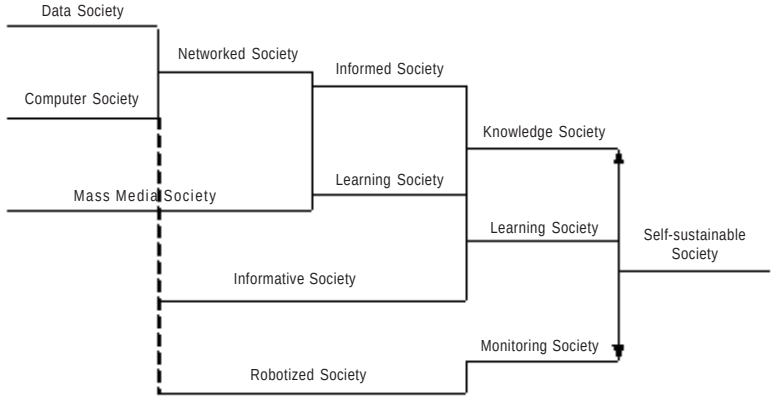
Figure 3. The path of information's development (The Targowski Model)



complex may help the informative and learning societies in their operations and developments.

Conclusion

1. The study of the information society types should influence the methodology of application systems design, since each type will have its own requirements that are appropriate for a given level of the society's information maturity.
2. As nations build their presence in the global economy, they need a national information policy to allocate and coordinate organizational responsibilities. This policy should include direct governmental involvement in developing an information infrastructure similar to urban and rural infrastructures. Some indirect incentives for the development and modernization of the information infrastructure should be provided too. A regulatory environment should be established to provide more conducive decisions on the modernization of the information infrastructure.
3. The information societies emerge as a neutral tool of social development.

It does not support any politics, either liberal or conservative. They close the loop of man-to-information and information-to-man. Their mission is the present and future of humankind equipped with the ability and tools of information and

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communication processing and handling. This may lead to more aware social decisions and actions. Nowadays knowledge, learning and consciousness is at the mercy of ICT tools that well or poorly control the development of civilization. This civilization's current mood is based on the importance of a sense of being.

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Endnotes

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Chapter II

Organizational Structure Without Hierarchy in a Dynamic Global Business Environment

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Abstract

The chapter deals with the inefficiency of classical business systems in a dynamic global business environment. The main reasons for inefficiency are complicated processes, which are limited and influenced by inadequate classical business structures. But in new circumstances business structures must be designed according to process needs. Classical business systems should be urgently renewed to survive. Furthermore the author concludes that a single business system re-engineering project is not the definitive answer. In the global business environment, changes are constant. The efficiency of business processes can be maintained and increased in the long term only by constant but effortless adaptation of structures. This is possible by the introduction of the organizational structure without hierarchy and the mechanism for dynamic adaptation of structures to business

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processes. The model of "process organization," which includes those elements, is described in this chapter.

Introduction

The contribution summarizes the research that deals with the problem of inefficiency of classical business systems in an era of dynamic changes of global business environment. By analyzing business models on the conceptual level, it is proven that business structures (structures of business objects) in classical business systems significantly influence the shaping and performing of business processes. However, from the organizational efficiency point of view, it must be vice versa: the performing of the process should determine and shape business structures. Business systems should be designed from the process point of view and supported by adequate information systems, which are at the same time the enabler for efficient business processes. There is also no doubt that only mangers and employees with eligible knowledge and skills can improve the organization (Ferjan, Vukovič, & Kern, 2004). Only they can run renewed processes successfully, so it is necessary to build process-dependent human resources systems.

It is obvious that inefficient business systems should be urgently renewed, if they are intended to survive in the dynamic global business environment. It is also true that all business structure changes, informational changes, and human recourse changes should be based on modernized business processes. But in globalization circumstances it is also true that changes are constant.That means that a renewed business system can be efficient only until the business environment imposes new requirements, implying the alteration of processes and the need for the reconstruction of the structures, information system, and human resource system.

That means that businesses system reengineering project is not the definitive answer. In the dynamic global business environment, it is necessary to set up a "mechanism" enabling constant, fast, and efficient adaptation of business systems to the changing processes.

Background of the Research

One of the characteristics of the global business environment (which is caused by great dynamics of changes of clients' demands) are smaller batches of products (or services) of the same sort. At the same time the assortment extends, and therefore more and more small batches need to be produced. This means the change of continual production (or service) processes into intermittent processes

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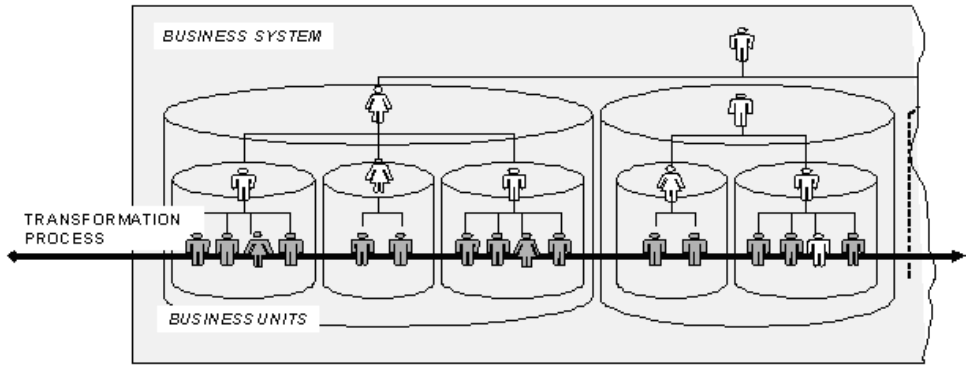
Figure 1. Model of a classical business system in a stable environment. It shows the efficient performing of the main business process because the organizational structure is formed according with process needs.



with less and less repetitions (Kern, 1998). Customers also demand shorter delivery times and last-minute changes. At the same time stakeholders expect larger profit, which demands cutting operating costs (that is, costs of work, equipment, stocks).

Such crossing demands cause organizational difficulties and lessen efficiency and, consequently, the competitiveness of the business system. Managers therefore face a demanding problem, which is being intensified. They are trying to achieve the competitive advantage by investing into equipment and technological development. However the great dynamics of changes in the environment and their radicalism often lessen or even nullify the effect of these efforts. There are many known cases of longer production times (and hereby costs) despite the automation of processes after introducing the expensive information technology (IT). The reason is the performing of additional activities that do not add value to the business system (preparation, waiting, finishing work, and transference of documentation and material among individuals). Plenty of time (energy, resources, and money) is spent on the adjustment of sequent or simultaneous activities and their mastery. The analysis shows that the majority of superfluous work is done due to the demands of the existent structures in the business system, which were formed in completely different circumstances from the present ones. It is shown that there was no such organizational gap in the time of shaping of business processes; the dysfunction between structures and processes appeared when processes were changing and structures did not manage to adapt to them. The experience has also shown that improving of the performing of individual activities usually does not contribute much to the increase of efficiency of the business system as a whole (Keen & Knapp, 1996; Kern, 1998).

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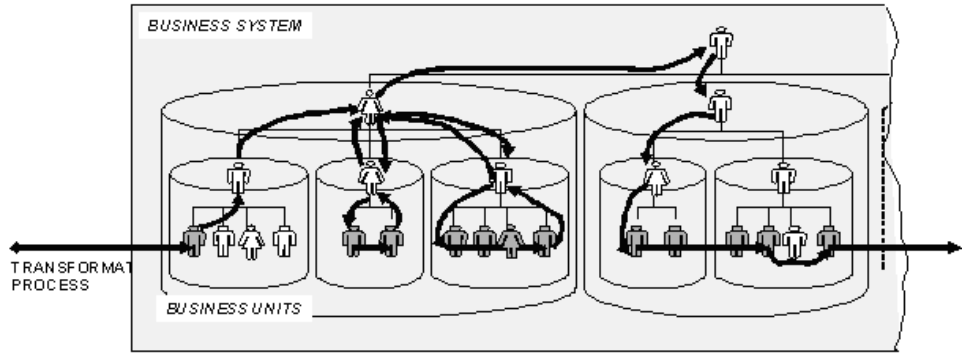
Figure 2. Model of a business system in a turbulent environment. It shows the inefficient performing of the transforming process after the change of the process, to which the organizational structure did not adapt.



In the described circumstances it is often shown that the main reserve the company still has is in changing the manner of work and relationships in the business system, therefore the change of organization. However companies have bad experience with various "reorganizations." These "achievements" were in the past a synonym for the change of the organizational structure, thus especially for the change of the executive staff competence and for reducing staff. The results were often even negative as the broken organizational structure, increase of formalization, and interruptions of existent communications even more complicated the processes performing (Kern, 2004).

The new-days answer is so called "process approaches to reengineering." Several variants have been developed and described in the last years (Keen & Knapp, 1996; Kern, 1998). The best-known and the most controversial perhaps is "business process reengineering" (BPR) (Hammer, 1996). All approaches are based on the same paradigm: increasing the efficiency of processes' performing by introducing process teams and generalists (Srica, 1997), simplifying complex processes, eliminating superfluous activities, standardizing activities, and performing adequately in shaping support (Keen & Knapp, 1996).

Business process improvement increases the efficiency of the redeveloped process. This is proved by many actual examples (Hammer, 1996). However the improvement by itself does not increase the business system efficiency in the long term. The reengineering demands elimination of the existent organizational structures and therefore the coordination problem of several intermingled processes arises. This causes the establishment of a new organizational structure, which again becomes inadequate in the next cycle of changes in the environment and consequential changes of processes (Kern, 1998).

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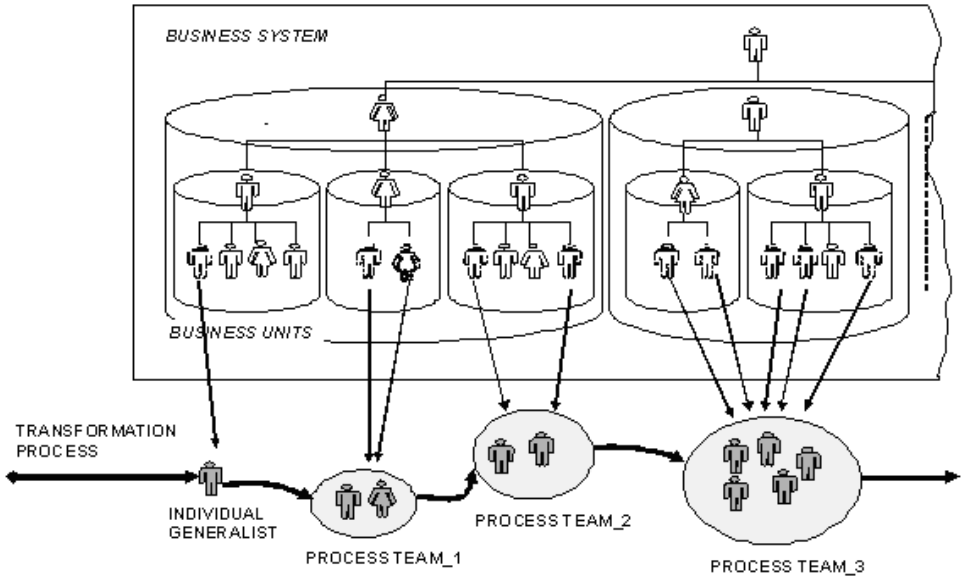
Figure 3. Model of a redesigned process, which is performed by tree process teams and an individual — a generalist



Definition of Research Area

The success of the business system can be measured by many criteria. The business system functions on the basis of intermingled processes that are carried out in it. One of the measurable criteria of success is efficiency, which is defined as the ratio between the outputs we get from the system after the performed process and inputs in the process. The business system is understood as "the whole of mutually linked business occurrences which enable business processes and they more or less influence each other." The business process is, regarding the general definition of process, defined as "dynamic sequence of dependant occurrences in the business system." The term "occurrence in a business system" is used for everything that can be perceived in the business system of business environment, irrespective of whether it is manifested in the physical sense or not (Kern, 1998), and it can be modeled by business objects. The business objects represent the copy of the occurrence from the real world into the model. The necessary (although not also sufficient) condition for the efficiency of processes is their natural and free flow from the entrance into the system to their exit. This means that the processes must not be limited with inadequate characteristics of business objects or inadequate relations among them.

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Among all modeled objects we must choose those that are similar regarding the chosen characteristics and unite them into aggregated objects. The term "aggregated object" indicates a construction that does not exist in the real world and is introduced into the model to understand business systems and business system processes. Among individual objects of aggregated object we can identify relations we will observe and transform them into the structure of an individual aggregated object. The individual aggregated object therefore represents the structure of chosen business objects.

Regarding the problem description and the abovementioned starting points, the research question is the following: We maintain that in the business system it is possible to shape and perform efficient business processes that will fulfill defined demands of clients. This is possible despite limitations represented by the availability of business objects. However this is possible only under the condition that relations among business objects are not considered. Newly shaped processes formed in such way can influence back on business objects, and especially significantly influence their relations (thus the structure of an individual aggregated object). The process organization is defined in this manner, where the aggregated object structure becomes a business process function and no more vice-versa! The existence of process organization needs assured dynamic and efficient adjustment of business system structures to changing processes, which can be accomplished by "the organizational structure without hierarchy."

Possible Solution: Forming the Organizational Structures Without Hierarchy

The objective of the business redesign is the shaping of such organizational structure that will not obstruct dynamic process changes and at the same time will enable the mastery of intermingled processes and resources. For this purpose business objects in the business system are classified into three aggregated objects. The aggregated objects are selected according to the common characteristics of objects forming these aggregated objects. The chosen aggregated objects are: resources, activities, and messages. The research limits itself to discussion of the aggregated object "resources," which is comprised of "human resources," machines and devices, material, and so forth. If we focus on the class of "human resources" and human resources structure, we actually observe the complexity of the organizational structure. This is

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(according to Mitzenberg) the most important standpoint of the organization. Human resources are the most general resources; we can attribute to them very heterogeneous characteristics, and at the same time it is hard to define their behavior. Therefore the model can be relatively simply generalized and applied also to other resource classes, and even more generally to all business system objects.

A human being, who is discussed with all his characteristics, takes part in the process as a whole individuum and is the basic element of the organizational structure. Problems arise when human resources are grouped on higher levels. From the very beginning structures were formed according to the needs of processes that were taking place in business systems when creating the system. Later on they did not adjust adequately to changes. The gap between the existing structures of business objects and the adequate structures (for the needs of as-is processes) is the main reason for inefficient processes.

The necessary condition for the performing of each process is the mastering of the process and business objects that are needed for the performing. The required business process outputs can be achieved in various ways; therefore a process with the same objective can have various versions. The selection of the required objects, which can be substantially different regarding the chosen process version, is followed by the identification of available objects in the business system (especially available resources). The identified resources of an individual kind need to be defined according to their quantity and quality. The next step is assignment of the adequate (but available) resources to activities in the framework of processes and their time and quantitative allocation. The procedure must be performed before the beginning of each process that is newly implemented in the business system. The procedure is relatively complex and demands considerable inputs. This consequently lessens the efficiency of the business system as a whole. The problem becomes acute because there are several processes taking place in the business system at the same time and they differ among each other regarding the number of repetitions. In this case it is necessary to consider the actual and the planned assignment (or occupation) of all resources in all activities. The structure adjustment procedure described above is under these conditions in the classical business systems practically unattainable in the real time. In classically formed business systems this is the main reason for structuring and grouping. The process preparation is transferred to a lower level in such a manner, and there is no need for the whole system coordination. This enables the process preparation in the real time, however, on the account of lesser efficiency (the sum of individual parts optimums is not equal to the optimum of the whole). Therefore the organizational paradox arises: the existing structuring manner is not acceptable from the standpoint of business systems' efficiency; however, business systems in general cannot function without proper structuring.

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The solution of the problem "of business objects adjusting structures to the needs of processes" is not in canceling structures in the business system and then creating new ones, which would again become inadequate in short time. The solution of the problem and the consequential increase of a system's flexibility is in structuring business objects on different bases. Business objects in the reengineered business system are structured exclusively on the basis of their characteristics, which are relevant from the standpoint of processes going on in the business system. This way a business object can belong to any number of classes, depending on the characteristics it has.

There is no hierarchy in the suggested model as we know it in the classical organization models. However all resources, and consequently all classes, to which resources belong are on the same organizational level. The business system organizational structure is basically hereby absolutely flat. The relationships in such a system are absolutely multilateral. However hierarchy does not exist, only in those time intervals when there is no process going on in the business system and business objects are passive. When a process is going on in the business system, certain business objects become active and relationships among them are established. In the next interval these relations can be totally different. After ending the process, business objects break the relations with other business objects, which were needed in the time of the performing of the process.

However it is not enough only to structure resources on the basis of characteristics needed for the performing of activities in the basic transforming process. To make the dynamic adjustment of structures possible, the definition of special characteristics or special competence of human resources is also needed. Those special characteristics enable and allow the organization of other resources and their management.

These characteristics classify human resources into three main classes:

- Basic human resources, in the framework of the reengineered process, take part in an individual work or sequence of activities, which add value to the process.
- Process owners can be a human resource with characteristics that enable him to understand the process and at the same time with competence that permit him to shape and perform the process. The process owner has no control over the resources performing the process until it actually takes place. The process owner has the characteristics and competence that enable him to shape the new process version, creating a process team, launching the process, monitoring, and finishing the process.
- Resource owners are grouped according to their characteristics and competence over the resources. They are competent for each resource

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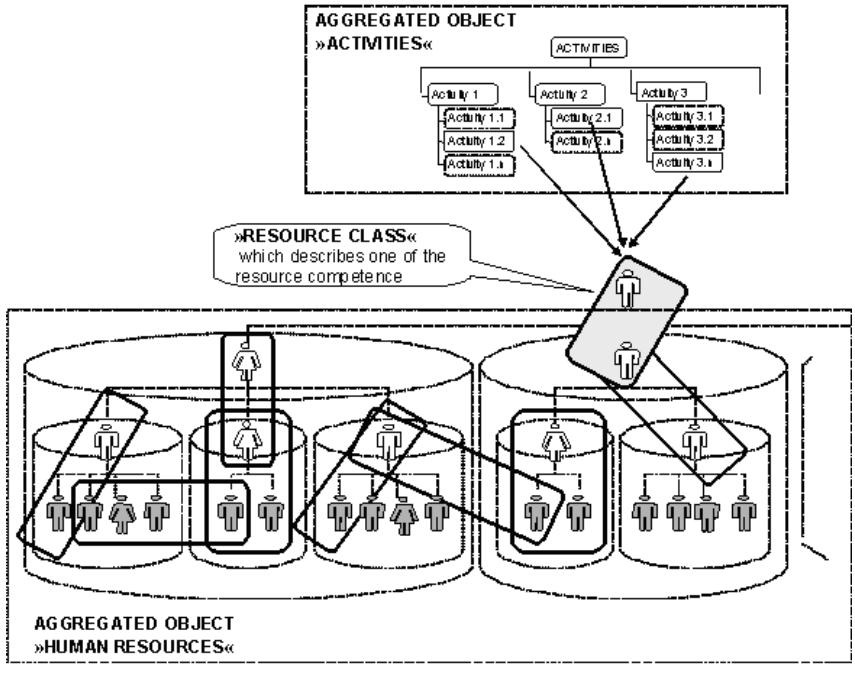
Figure 4. Schematic figure of resources and their classifications into classes according to the characteristics of resources



group (resource class). That means each is competent for managing and coordinating the characteristics of resources, which are in a certain class, and therefore he is not a functional leader and not hierarchically superior to resources. An individual resource owner can be competent for any number of classes of basic resources.

Interactions among these classes of resources are the basis of the reengineered business system and enable changing business object structures, which theoretically don't have permanent structures.

Dynamic Adaptation of the Structure Without Hierarchy to Changing Processes

The processes in the model are defined as the usage of business objects in an observed time interval. The application of a business object signifies that it is not "passive" anymore and becomes "active." When the business object is in the

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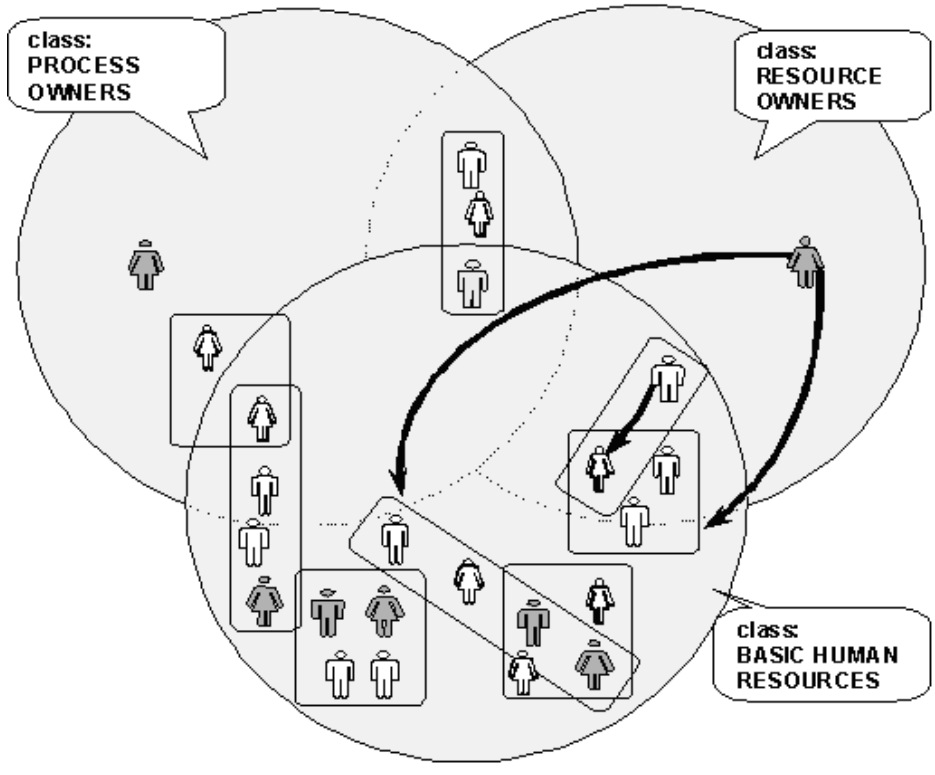
Figure 5. Main classes of human resources and their placing into the described model



passive interval, we can say that it is in a certain state, and when the business object becomes active, this means that it is being transferred from one state to another. Therefore the process can be modeled as the sequence of changes of business-object states in time.

The business objects of the same main class are always in a certain mutual relation – they form a structure. It is possible to define for any process such a business object structure that the process efficiency will be maximal. As processes change during time, the optimal business object structures are different in different time intervals. Therefore it is true that business object structures depend on the use of business objects and have to adapt to processes continuously. On the other side we cannot use too much time for adaptation due to searching common efficiency, for this would significantly lessen the efficiency of the system as a whole!

The mechanism, which enables efficient adjustment of business system structures to changing processes, is built on tree bases: **repository**, where all business

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objects and process models are stored, **meta process**, by which new processes and proper structures are formed in the real time, and time **schedule**, for assigning and allocating resources.

Business System Repository

The repository is defined as a unique collection of meta data, data, object descriptions, business models, algorithms, rules, conditions, instructions, and so forth (Jacobson, Ericson, & Jacobson, 1995; Sheer, 1999; Taylor, 1995). The process models are classified in the repository according to the expected output (a product or a service). The same business objects can appear in any number of processes; however, each object is defined in the repository only once:

- The repository is available to process owners, resource owners and basic resources through the appropriate information technology (Kern, 1995).
- Process owners identify the existing processes and all process versions using models in the repository. They can also form models, complement, and update them.
- Resource owners can, by comparing the available and the needed resource characteristics, which are written in the repository, suggest the assignment of resources to individual processes and their allocation to individual activities. Resource owners can assign characteristics to resources and change them, and in this way they update the repository.
- Basic human resources receive messages through the repository regarding the belonging to the process team and the performing of the assigned activities in individual time intervals. The basic resources inform the repository about the level of completion of the assigned activities and hereby update data on their availability.

Meta-Process

It is necessary to define a new process for accomplishing simultaneous adaptation of business object structures to the changes of processes. It is called "meta-process." The meta-process describes securing the required business objects that enable the shaping and performing of any process in a process-oriented business system.

- The meta-process starts by receiving a message (stimulus) from the environment or the system itself, which contains a demand for a product or

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a service. The message is sent by a customer and received by the process owner in the system *(step one)*.

- The very first activity in the meta-process is the identification of all process versions, which can provide the demanded product or service. Models of all process versions that are possible in the discussed business process are stored in the repository. The process owner selects the appropriate process versions and classifies them according to the level of their suitability *(step two)*.
- The calculation of resources is carried out in the repository, and it adjusts to the available resources. The calculation result is the suggestion of one process version, which is the most appropriate regarding the system limitations *(step three)*. The list of available resources with proper characteristics is suggested.
- Resource owner confirms or rejects the proposal for the resource assignment from the class he is assigned to *(step four)*.
- The process owner gains the necessary resources and forms a process team without hierarchy. The process team comprises all resources needed for the process performing. The process owner can also be a part of the team if the selected process version demands it and the process owner has proper characteristics *(step five)*.
- The process team exists as long there is the need for it, until the process is finished. When the process is finished, the process team is dissolved.

The most complicated case of meta-process is described above. In practice the meta-process can be fundamentally simplified for those processes, which are carried out in the system continually or their repetitions accurately anticipated. This enables dynamic changing of the organizational structure in the process-oriented business system.

Resource Assignment and Allocation Scheduling

In the proposed model there are no limitations of process performing due to unsuitable structures; however, the availability of individual business objects (especially human resources) in a certain time interval remains an important limitation. The dynamic adaptation of structures is based on leveling the resource availability with known characteristics in a time interval and the needs for certain resource characteristics in the same time interval. For the performing of the observed process, the resource availability has to be higher or equal to the needs in each time interval. This condition has to be met in all processes in the system

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and in all the resources taking part in processes. The condition to achieve dynamic adaptation of structures is the introduction of resource assignment and allocation system and time schedule of the performing of all processes in the system.

Certain conditions have to be fulfilled for this (as *described in step three in meta-process)*:

- Repository with process models must be updated;
- System for setting process performing priorities must be arranged;
- Data on the degree of active process realization must be updated; and
- Scheduling has to be implemented simultaneously for all active and planned business system processes in real time.

We can describe scheduling and resource leveling only conditionally. The essential difference between the classical scheduling and the described way of scheduling is that in the suggested model we deal with resource classes and not directly with resources. Therefore we schedule the resource characteristics and resources as objects, and this essentially increases system's flexibility. This is true for all types of resources (human resources, machines and devices, materials). Another difference is the option of several process versions, which result in the same outputs, and choosing that one for which we have available resources with proper characteristics.

Model of the organizational structure without hierarchy enables adjusting structures to changing business processes, and it also has some additional advantages:

- It enables the mastery of the business system in the situation of big resource fluctuation;
- It enables the mastery of the necessary and available resource characteristics in the business system;
- It stimulates resource generalization as it enables promotion only over increasing belonging to several resource classes;
- It enables a high degree of business system self-control; and
- It enables simple business system adjustment when business system grows.

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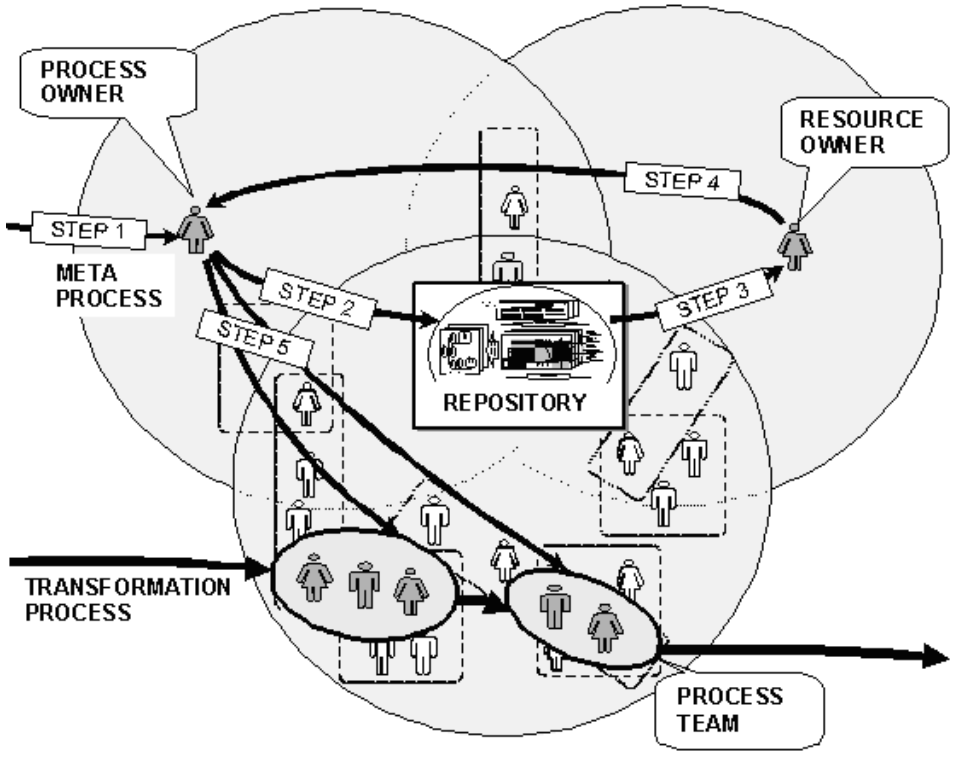
Figure 6. Model of the organizational structure without hierarchy and mechanism for structure adaptation to the needs of processes



Conclusions and Future Trends

We can conclude that business system efficiency can be improved by adjusting structures to business processes. But in a dynamic global business environment with the great dynamics of changes, the efficiency can be maintained and increased in the long term by the introduction of the organizational structure without hierarchy and the mechanism for dynamic adaptation of structures to business processes, therefore by establishing a "process organization."

The condition for the successful introducing of the model into practice is an appropriate process order. The paradox, that we are introducing an even stricter order than it is in the classical hierarchical organization into the process organization, which is based on independence and innovations, is only apparent! The prescribed behavior of resources is demanded outward, as the communica-

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tion intensity is greater than in the classical hierarchical organizational structure. Inward (for example, inside the process team) freedom is higher than in the classical organization. Rules are defined on the system level for all participants and observing them lessens the level of system entropy. This signifies that the system anarchy is lower and this is the necessary condition for a higher level of democracy and consequently higher level of individual freedom.

All this can be achieved in the dynamic global business environment. Such an environment is sometimes defined with the term "urban chaos." The suggested model enables business system efficiency in chaotic circumstances.

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Chapter III

The Organizational Transformation Process to Globalization

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Abstract

The topic of globalization is increasingly attracting the attention of software engineers, system researchers, and, most interestingly, business practitioners. In recent years there has been a perceptible increase in demand from business companies, services, and non-profit organizations and even from government bodies around the world to adopt and utilize Internet-based technologies in order to transform their traditional business/ service activities into an electronic business environment. Such a transformation empowers organizations to expand their business processes beyond their local borders and move the entire business from localization to globalization. This chapter introduces and investigates the entire organizational transformation process to globalization. It starts with emphasizing the necessity of moving local businesses' practices to a global market with the highlight of the major driving forces for globalization. Furthermore this chapter examines a number of vital issues that may strongly impact the final outcomes of the entire transformation process.

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These issues include main obstacles, resistance to change, and risk factors associated with the transformation process. Moreover this chapter proposes a conceptual framework with the objective of providing a good comprehension of the involved factors in transformation with their relationships. The last section of this chapter focuses on examining and exploring the foremost transformation maturity stages, readiness, adoption, diffusion, and retrospective.

Introduction

For the past decade, globalization has been a universal and popular topic in a wide range of academic teaching and research and also of some organizational experimentation. In today's economical environment, the word "*globalization*" became one of the most attention-grabbing and frequently used terms and recently engrossed a great deal of consideration not only from business sectors but also from governmental institutions, academia, and even non-profit organizations around the globe. From a purely business perspective, globalization is necessary for organizations to gain a competitive edge and to take advantages of the new ever-growing Internet global market.

Globalization occurs when business companies decide to expand their business practices and processes beyond their national or local boundaries and take part in the emerging global economy. As a result, organizations will present themselves in foreign markets whether physically and/or virtually to target and reach global customers and compete internationally. Hence globalization is the name that has been given to the social, economic, and political processes that have produced the characteristic conditions of contemporary existence. This perception has made it possible to begin to imagine the world as a single, global space linked by a wide array of technological, economic, social, and cultural forces (Appadurai, 1996).

So globalization can be defined as the integration of the world's culture, economy, and infrastructure through transnational investment, rapid proliferation of communication and information technologies, and the impacts of free-market forces on local, regional, and national economies (Cvetkovich & Kellner, 1997).

From a business perspective, globalization is the process of internationalization of business practices and existence to reach a global market with almost no limitations. From past experience, it has been confirmed that this kind of transformation process is difficult, costly, and risky simply because it involves a number of imperative issues that must be well-planned and managed for a successful result. Some of these issues include product/service adaptation for

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the new global market with a wide diversity of cultures, the adoption and diffusion of new technologies and innovations coupled with the necessary culture change, and the essential resources needed for the transformation.

Therefore the organizational transformation process to globalization implies a number of problems, commonly including investigating the new global markets, complying with different international legislations and laws, adopting and utilizing new technologies, and managing and mitigating the natural resistance to the necessary human and organizational culture change. Hence globalization, as a new business approach, requires a new way of thinking, understanding the new users' requirements, and comprehending the new market environment. Globalization arrived on the e-world scene with a number of new concepts, such as denationalization and virtual organizations that required a totally new way of planning and conducting business. It also arrived with strong emphasis on a number of the existing effective concepts, such as customer satisfaction, cost reduction, and product quality improvement and gave them more prevalence and prominence.

In summary the organizational transformation process to globalization is a serious and risky procedure that may impact on the entire organization. Therefore it must be well understood, planned, and managed for fruitful results and that is, *indeed*, the focus of this chapter.

In general this chapter aims to provide organizations that are considering the move to globalization with clear understanding of the entire transformation process and all the prerequisites for a successful transition. It starts with a full explanation of what is involved in the process followed by a comprehensive investigation of the key success factors that may impact on the process. Also this chapter discusses some of the common problems that might face management and workers during the process. We hope that both managers and researchers can find this chapter helpful and useful for their intended projects and use it as a transformation guideline.

The Necessity of Globalization

Moving to a new working environment such as globalization is considered a major organizational change. The process of the transformation to globalization is a mission with many problems. It has been proven to be a risky, costly, painful, and unpredictable exercise. It is a major and difficult task to achieve because it has to deal with both organizational and human culture change. The question facing us now is, do we need the transformation?

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Organizations that are willing to adopt a new business approach and/or introduce a new technology to their current environment must have a very strong and good reason(s) as to why they need to change their existing work culture. While innovation requires creativity, it also involves a great deal of hard work (Humphrey, 2000). Organizational changes should be introduced to answer some needs and/or to solve business problem(s).

Consequently all people behind the transformation — adopters, senior management, and decision makers — have to know not only "*what*" but also "*why*" they need to go through the transformation process and, hence, they must have a compelling and persuasive reason(s) to be able to "*sell*" the project to everyone involved. People need to know "*why*" they have to change their way of doing things in order to be supportive and enthusiastic to the change. They need to not only realize the necessity and the importance of the change but also the benefits and value of sharing that change with their organization.

Sultan and Chan (2000) declare that, over the last 20 years, many of the changes in organizations have been predominantly driven by two factors: globalization and technology. Hence moving businesses to global markets have increasingly played a critical role in shaping and influencing the success of companies in many industries.

It is increasingly clear that the move to globalization and adopting the Internet and e-business technologies is the ultimate way to cope with the rapidly changing business needs. Traditional localized organizations started realizing the great benefits that others in the industry were gaining by shifting their business activities to a global environment.

In addition adopting new business approaches and technologies has a significant contribution in market position and business revenue. Business has only two basic functions, marketing and innovation that produce results; all the rest are cost (Drucker, 1974). Today and more than ever before, a strong market position must be based on an organization's market and technical competence (Humphrey, 2000).

Driving Forces for Globalization

Globalization as a revolutionary business approach has emerged as a direct result of many driving forces that interact with each other and establish an integrated impact on the development of global business activities. Undoubtedly the emergence of new communications and information technologies has significantly reduced the existing physical, social and political barriers that may limit business firms to exchange and trade at a global scale. These technologies have accelerated the process of cultural, social, and environmental change toward the new ways of thinking of trading and competing globally. Information technology

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improves the organizational ability to conduct and manage business at multiple locations across the globe (Robertson, 1992). The rapid development and utilization of the international network (Internet) and associated technologies have increased the speed of information transformation among countries in the world that economizes the cost and time to transmit the information of the international trade transactions.

Besides the huge advances in technology, international trade legislations and regulations can form a strong obstacle for organizations to move to globalization by expanding and trading in different countries. Fortunately many countries around the world have realized the importance of globalization and its positive role in enhancing the country's economic conditions. According to a United Nations survey (United Nations, 2004) during the last decade, more than 150 countries have made a large number of serious changes in their law and legislations that govern international trade. Some of these changes involved liberalizing a country's foreign investment regulations to make it easier for foreign companies to enter their markets. These changes have also resulted in a considerable reduction in international tariff rates and investment parries. Additionally, many countries have also removed or at least reduced the financial restrictions to foreign direct investment (Jin-young, 2002).

In addition to all the above, there are many other driving forces that may contribute to the development of globalization, including a desire by people to take advantage of the opportunities provided by interactions with other societies through global trades, the continuous improvements in communication and transportation technologies, global economic growth, pressure for quality improvement and cost reduction, and declining international trade barriers. Buchanan and Huczynski (1997) conclude that factors such as customer requirements, trade barriers, competition, emerging markets, environmental concerns, political pressures, and technology can form strong driving forces that may influence organizations to undergo serious changes such as the transformation to globalization.

Moving to Globalization is Problematic

Despite the fact that the transformation to globalization has become one of the dominant forces in the e-world today, there is still a large number of organizations that have never considered, let alone completed, the transformation. For them the adoption of the Internet, e-commerce, and web technologies implies a number of problems, commonly including adoption and diffusion of new technologies and resistance to the necessary organizational culture change (Henderson-Sellers & Serour, 2000).

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Therefore the main transformation problems can be categorized further into two main streams. The first relates to the effect and the impact of the various key success factors, including human, organizational, technological, environmental, business, and contextual factors. The second relates to the planning and management of the entire transformation process. Experience shows that improper planning and poor management are among the major reasons contributing to the transformation's failures.

Risks Associated with Transformation

Due to the fact that the process of transforming organizations to global markets involves a considerable amount of research, investment, and organizational and human culture change, it must have some risks associated with both the required culture change and the technology itself with the uncertainties of the competitive marketplace.

New technologies such as Internet, web services, and mobile computing are considered the foremost facilitating power and driving force for globalization. As a result, one of the most challenging issues is the possible risk involved in mismanaging people's change during the introduction of new technologies. Therefore management must do everything in their capacity not only to fully understand the associated risks involved but also plan to eliminate or mitigate those risks. Furthermore Humphrey (2000) has stated that high technology is always risky and the search for a technical solution confronting business problems always faces the highest risks of all. He also stated that behind any successful project, there are invariably a few key technical decisions that can make the difference between success and failure. Two-thirds of all new product development funds are spent on failures (Humphrey, 1997).

Main Obstacles for Moving to Globalization

With every introduction of any new business approach and/or adopting new technologies, there will always be a number of obstacles that prevent or reduce the chance of pursuing the implementation of the new approach (moving to globalization in this context) and/or the adoption of such new technologies. These obstacles could be related to, and/or be initiated by, any number of organizational internal and/or external factors. External factors may include the different international political, economic, and legal systems and, also, the existence of different cultures such as social culture, languages, and religion.

Some examples of the internal factors are inflexible organizational culture, hierarchical organizational structure, lack of management commitment and support, human resistance to change, and insufficient resources needed for the

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transformation. Some examples of the external factors are commitment to external environment critical changes and constraints of regulatory, government, and political issues. For a successful organizational move to global markets, champions and supporters behind the move should not only identify all possible obstacles but also work hard to defeat them or at least mitigate them to eliminate and/or minimize their negative impact on the whole process.

Some other obstacles are:

- No compelling reasons for the transformation.
- People's resistance to change and adopting new technologies.
- The conflict of interest between stakeholders – mismanagement of expectations.
- Commitment to critical environmental changes (for example, Y2K, Euro conversion).
- Lack of globalization awareness, knowledge, education and expertise.
- The ambiguity and uncertainty of the final achievements.
- Organizations are not realizing the benefits of moving to global markets.
- Heavy investment in existing systems.
- The necessity of organizational and personal culture changes.
- Time, cost of training, and tools required to diffuse and master the new technologies.
- The lack of well-defined transformation guidelines to assist organizations in planning and managing their move to globalization.
- Lack of commitment.
- Lack of expertise on new technologies.
- Misunderstanding the organizational culture change.
- Misunderstanding the different human cultures in global markets.
- Changes in organization's environment such as merging or restructuring.

The Need for Transformation Guidelines

While it is clear that the transformation to globalization has been highly successful for many companies, there are still a large number of organizations that have not yet transformed. This is a reflection of the traditional bell shaped adoption curve in which 50% of companies are "followers," or "laggards," in the adoption of any new business approach and/or new technology.

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Despite the above fact, there is no doubt that there is a great number of organizations that are interested in moving to the globalization era but do not know "*what*" is involved, "*why* and *how*" to do it, "*where*" to begin, and "*what*" is the first step. And how long will it take? Therefore these organizations are in a desperate need of guidelines to answer their questions and lead them through the entire transformation process. It is well known, as derived from some industrial projects, that the organizational transforming process to globalization is not a "big bang" exercise; rather, it is a long, costly, risky, and extremely difficult exercise. No organization can expect to move from a local to a global business environment without high investments, productivity reduction, and the challenge of critical risk factors.

Senior and middle management find it hard to proceed when there is (still) very little guidance available from real-world experience. Despite the fact that the advantages of globalization have been accepted by the mainstream of the business industry, the process of transforming organizations to a global environment is considered a paradigm shift that requires not only the willingness and commitment from everyone within the organizations, but also the understanding, realization, and readiness for major culture changes. There is a need for guidelines to get organizations from their traditional business environment to one in which globalization paradigm is dominant.

Therefore the process of the organizational transformation to globalization needs to be well organized, planned, phased, and very well managed. Also it can't be ad hoc or chaotic; instead, it must be very well engineered. Thus in the context of moving business organizations to a totally global business environment, following transformation guidelines specifically constructed to assist them in planning and managing their move may enhance the process of managing people's natural resistance to change and increase the chance of a successful adoption and diffusion of e-commerce and internet technologies. Zakaria and Yusof (2001) emphasize the significance of following transformation guidelines by arguing that a successful organizational transformation is a result of thorough strategic planning, proper implementation, and cooperation by all groups, together with high commitment and minimal resistance.

The paramount guidance that could be offered would be a means by which the technology insertion (such as Internet, e-commerce, and web services) would be accomplished. In other words, a process needs to be used and followed to support the transformation to global markets and also support the adoption and diffusion of new technologies. While some companies have successfully moved to globalization, the process they followed has never been written down, published, or otherwise disseminated. It is likely that the transformation processes followed have been ad hoc and are unlikely to ever be formalized.

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The Transformation Conceptual Framework

Here we propose a conceptual framework for the transformation process with the intention of providing a good understanding of the involved components and their relationships.

A conceptual framework is a graphical and descriptive presentation of the process at hand. It illustrates all involved components, giving each a descriptive name, and explores their supposed relationships (Miles & Huberman, 1984). It is usually constructed to assist managers in defining their process focus and boundaries as it:

- Explains the main dimensions to be studied.
- Illustrates the key factors.
- Shows the presumed relationships between factors.

Figure 1 represents a graphical and descriptive conceptual framework for the process of the organizational transformation to globalization in order to define the scope, the boundaries, and the main objectives of the process. It shows six double-lined rectangles representing the main groups of factors that may influence the transformation process and must, consequently, be well planned and managed for a successful mission. These groups are:

- Human factors.
- Organizational factors.
- Technological factors.
- Environmental factors.
- Business and IT strategic factors.
- Contextual factors.

There are two groups of factors, human and organizational, that lie inside the organization's boundary, and we call them the "*intra-organizational*" factors (*represented by lined-shaded rectangles*). The other four groups of factors, technological, business, environmental, and contextual, lie outside the organizational boundary, and we call them the "*extra-organizational*" factors (*represented by shaded rectangles*). Also, this framework specifies the relationships, or the interactions, between all the different framework components. The

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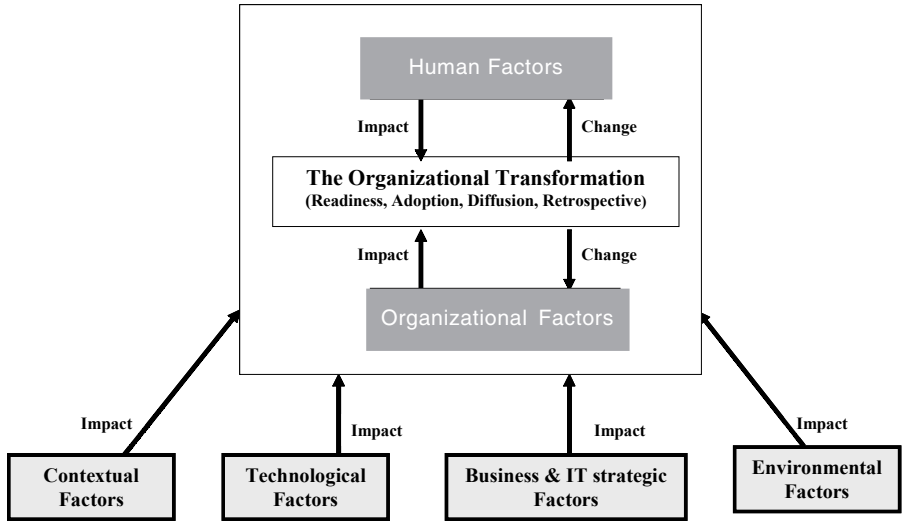
Figure 1. Transformation conceptual framework



framework assumes some relationships between the transformation endeavor and all other components, as indicated by the arrows. These relationships are purely logical, such as the impact of human and organizational factors on the process.

The following section lists the major intra- and extra-organizational factors that may influence the transformation process to globalization.

Human Factors

- Human culture and the necessary culture change.
- Existence of transformation champions.
- Involvement of customers in the transformation process.
- Misunderstanding the critical requirement for different human culture in globalization.
- Appropriate communications channels between the organization and its customers.
- Appropriate communications among distributed organization's teams.
- Workflow and groupware (employees effectively working in teams).
- Need for high-quality and accepted products by global customers.
- Flexibility of work culture to change in order to master the new business approach.

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Organizational Factors

- Management commitment for the new business approach.
- Delivering products and services on-time and within budget to global customers.
- Willingness and capability of carrying out organizational change.
- Flattened organizational structure.
- Flexibility of organizational culture.
- The existence of internal research and development policy to support and promote the organizational move to a new technology.
- Technological awareness and its adoption.
- Resource availability includes budget and people.
- Demands on management performance.

Environmental Factors

- Critical external changes such as GST, Euro conversion, and the Y2K problem.
- Tough competition because of new market dynamics.
- Business acquisitions such as takeovers or mergers with other businesses.
- Changes in regulatory forces such as government legislations.
- Result of investigations in regard to globalization.
- Influence of globalization success stories.

Technological Factors

- Necessity of new technologies, including Internet, e-commerce, web services, and mobile computing.
- Availability of technology elements.
- Accessibility.
- Complexity.
- Trialability.
- Compatibility with organizational environment.
- Suitability to business requirements.

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- Maintainability.
- Affordability.
- Capability (an enabler of other technologies being used, such as the Internet, intranet, and extranet).

Business Factors

- Corporate objectives and strategic plans.
- Business expansion.
- Growth in business.
- Business continuity.
- Reengineering of existing business processes to achieve radical improvements.
- Cost effectiveness.
- Moving to distributed systems environment or enterprise-wide computing.
- Adoption of the Internet/intranet-based operational environment.

Contextual Factors

Contextual factors represent any other related factors that are not listed in the above groups, but they may influence the transformation process including:

- Global market competition.
- Global cultural requirements.
- Global multilingual markets.
- Global time zones.
- Virtual existence.
- E-commerce and multi currency.
- E-commerce and human behavior with credit cards transactions.

The Transformation Process

This section focuses mainly on the theory and practice of the entire process of moving organizations from localization to globalization. The major objective of this section is to provide organizations with a complete understanding of the

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major stages of the transformation process lifecycle. Such an understanding can guide organizations in planning and managing their move to globalization and effectively competing globally.

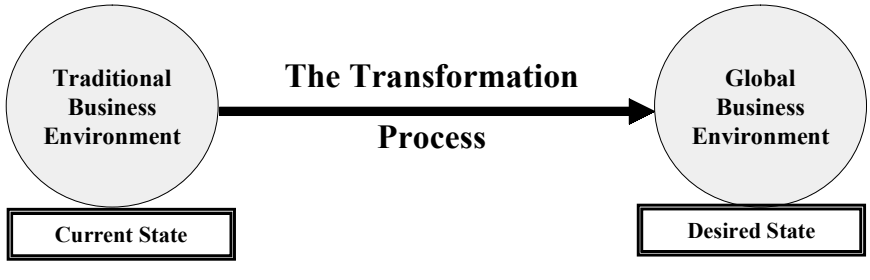
In general going through an organizational change and/or adopting new technologies must add a tangible value to the organization that is undertaking it. The organizational move to globalization is the process of turning new ideas and concepts into creative and useable methods and techniques that assist organizations in expanding their marketplaces and extending their customer base around the entire world.

In order for business organizations to solve the problem of ever-changing business requirements, meeting the ever-increasing customer demands and expectations and enhancing the way they do business, they need to change their existing way of thinking to be able to achieve the most appropriate solution for the problem(s) at hand and/or work out a better way to do things. To cope with today's global e-market and to gain competitive advantage, organizations need to look for new and better ways to do their business and also more effectively to stay ahead of their competitors.

To do so, they need to plan to adopt and utilize new technologies or innovations that may enable them to achieve their goals. First organizations need to understand their existing culture and work out the required changes to become familiar and comfortable with the new environment to which they are aiming to move. Once they have succeeded with the shift to the new environment, they will be able to adopt and utilize the new technologies much more effectively. Also, with the achievement of culture change, they will be able to enhance the way they do things and implement these new changes in the most appropriate way.

So the transformation process can be thought of as a road map between the organizational current and desired states as shown in Figure 2. Organizations that are aiming to move their traditional local business practices to a global business environment must comprehend and be fully aware of the different maturity states of their process.

Figure 2. Transformation process, the road map between the organizational current and the desired states



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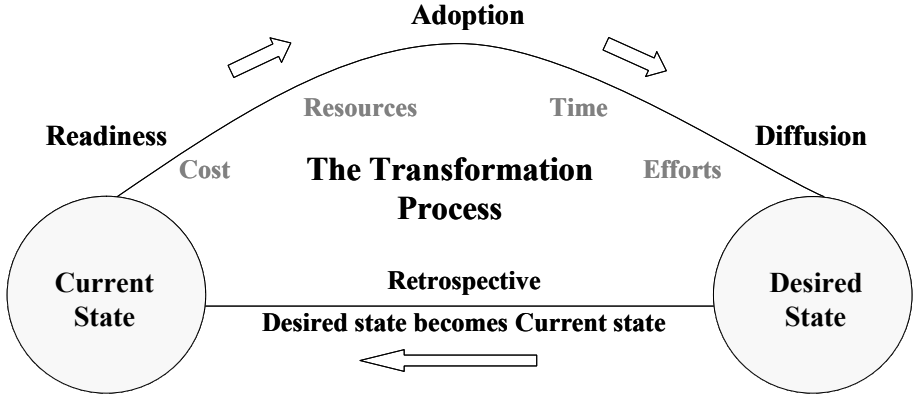
Bridging the Gap Between Current and Desired States

From a different perspective, the transformation process can also be viewed as a road bridging the gap between where the organization currently is in terms of business practices and where they are intended to be as illustrated in Figure 3.

As demonstrated in Figure 3, the transformation process aims, through its four major stages, to move organizations from their current common practice environment to their desired and hoped best-practice environment. Often efforts and resources needed to adopt new technologies, such as the Internet and Web services, to close the organization's practice gap are difficult and costly. Additionally and as shown in Figure 3, during the process of transformation, cost, resources, time, and effort will rise considerably and, at the same time, productivity will drop as people are more overloaded and busy learning the new ways. The entire process can be long, unpredictable, risky, and burdened with troubles due to the necessary culture change and the serious decisions to be made. All people who are involved in the transformation need to understand their current intra-organizational culture and perform the required changes in order to adopt and optimize the use of new approaches to conduct their new business processes (Serour & Henderson-Sellers, 2002).

Once organizations have completed their transformation successfully, cost, resources, time and effort will continue to drop and productivity and revenue will escalate rapidly. At that time, the organization's desired state becomes their current state. The transformation process will continue to achieve further improvement and optimization and ensure people are kept up-to-date with the

Figure 3. Transformation process bridges the gap between current and desired practice states



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newly adopted technologies. Once organizations have arrived at their new business environment, keeping up to date with the newly adopted technology becomes a separate yet important issue.

Transformation Maturity Stages

(Readiness, Adoption, Diffusion and Retrospective (RADaR))

To illustrate the extent and the scope of the entire transformation process, we state that the complete process of transformation may go through a life cycle of four maturity stages: Readiness, Adoption, Diffusion, and Retrospective (**RADaR**). These stages are focusing on different aspects of the whole process and aiming to achieve different goals. In other words RADaR has four different stages that represent the four different transformation maturity states that organizations may go through in an iterative and incremental manner in order to move their business practices to global markets. The following section will briefly introduce these major stages followed by a detailed description of each stage.

- **Readiness:** Focuses on transitioning both management and development teams to a totally global business environment and achieving the necessary culture changes.
- **Adoption:** Focuses on assessing, evaluating and acquiring the appropriate and needed technology elements, such as Web services and e-commerce, middleware, databases, and so forth to a developing organization's new software systems.
- **Diffusion:** Focuses on enforcing the principles and conceptions of globalization, deploying and spreading out the adopted technology elements. Also this stage aims to stop people from getting back to their old ways and habits to perform business processes.
- **Retrospective:** focuses on assessing and evaluating the transformation achievements and finding any defects for corrections. It also aims to define any possibilities for further improvements, enhancements, and optimizations.

The process of transformation starts with the first crucial and important stage (**Readiness**) that focuses on getting the organization ready for the new paradigm. This stage involves a number of activities aimed at making the organization familiar and comfortable with the new business and technology environment before any attempt to implement and disseminate the new technology is made. This initial attainment becomes the pre-condition for organizations to successfully complete the rest of their transformation process to accomplish

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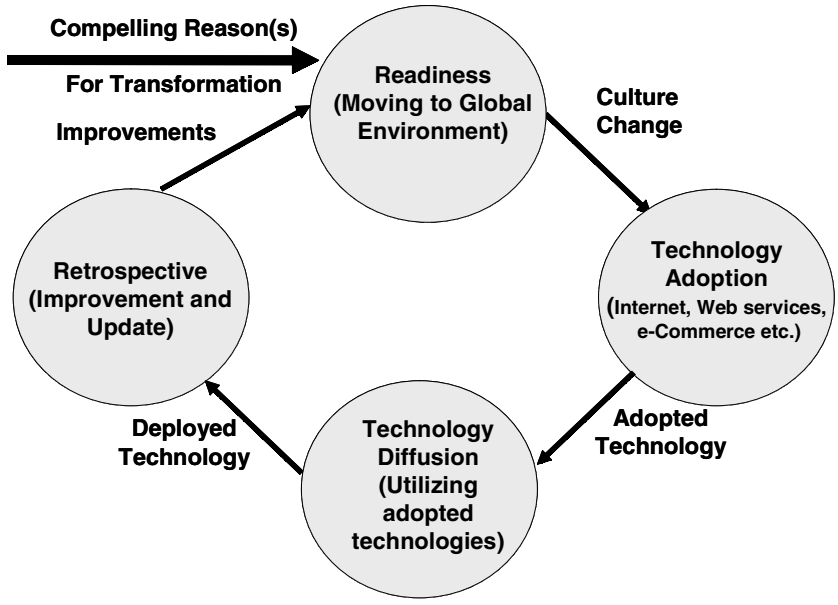
what they have planned for moving to global markets and adopting and diffusing new technologies.

The subsequent stages (**Adoption and Diffusion**) focus on the acceptance and dissemination of global technology products such as Web services and e-commerce. Through the final stage of the process (**Retrospective**), organizations will be able to assess the whole situation retrospectively and draw attention to any area for improvement, keeping the entire organization updated with the

Table 1. The organizational transformation maturity stages

Transformation Maturity stages	Main Activities
READINESS (Pre-conditions)	Moving organizations to a global environment with culture change and eliminating obstacles
ADOPTION (Technology Acceptance)	Technology assessment, selection and implementation. Education and training on new technologies
DIFFUSION (Technology Dissemination)	Deploying the adopted technologies in practice Stop people from going back to old habits
RETROSPECTIVE (Post-conditions)	Evaluation and continuous improvement Keeping up-to-date with new technologies

Figure 4. The organizational transformation to globalization



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adopted technology. Table 1 shows our perception of the entire transformation process with its four maturity stages.

It is worth noting here that within each stage — and sometimes between stages — there is a degree of iterative, incremental, and parallelism. In other words the activities and tasks within each stage can be carried out and achieved in an iterative, incremental, and parallel manner that provide organizations with more flexibility and process control. Figure 4 illustrates these four major stages with their contracts.

Readiness Stage

Readiness, as the first stage of the transformation process, focuses on getting the organization familiar with the new business environment and carrying out the associated changes as the precondition for the adoption and diffusion of new technologies. It is mainly related to the required organizational and human culture changes in order to obtain and maintain people's acceptance and senior management support and commitment. It deals with all IT professionals in terms of changing their culture and their way of thinking about business practices. It intends to gain people's high morals and willingness to positively participate in the transformation process.

The main activities considered necessary to be carried out during this stage to prepare the organization to move to a global business environment are:

- Identify and understand the compelling reasons for the transformation.
- Understand and assess the current organization state (local state).
- Understand and assess the desired organization state (global state).
- Analyze the major key success factors for the transformation.
- Realize the required organizational and human culture change.
- Obtain and maintain management and customer support and commitment.
- Provide management, workers, and software developers with formal and adequate introduction to globalization with all associated issues and also provide them with appropriate education and training.
- Identify the obstacles and barriers for the transformation.
- Sell to everyone the transformation project with its associated changes.
- Construct a transformation plan and secure the required resources.
- Conduct a comprehensive cost-benefit analysis and possible financial risk analysis involved in transformation.

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The pre-conditions for this stage are the existence and the full understanding of the organization's compelling reason for moving to globalization and the official approval from senior management as a commitment to start the process.

During this stage, management and information technology (IT) teams will carry out a number of activities in order to define and assess their current and desired states. They start first with assessing the current organization's state in terms of available resources and its IT capabilities. Then it is necessary to assess the desired state requirements in order to determine and estimate the required resources to carry out the transformation. Further assessment activities are focused on assessing people in terms of their skills, knowledge, and willingness. Beside these assessing activities, there are other activities, including gaining management support, defeating people's resistance to change, providing the appropriate education and training, and increasing the awareness of any required new technologies.

The major post-condition of this stage is changing the organization's and the individual's culture to be able to adopt to their new business environment and utilize the required new technologies. Other important deliverables from this stage include, but not are limited to, maintaining full senior and mid-management support, minimizing people's fear, uncertainty, and resistance to change, allocating all required resources, including people, and full analysis studies of the risk factors involved, as well as the various key success factors that can influence the entire transformation process.

Adoption Stage

The adoption stage usually starts when the previous stage (*readiness*) is almost complete, with the release of its deliverables that become the pre-conditions for this stage. The major activities of this stage are concerned with determining, choosing, evaluating, and purchasing the technology products that are required for managing the new business processes. No doubt IT plays a vital role not only during the transformation process to globalization but also to manage and conduct the new business processes. Information technology in general is often seen by management as an essential means to advance and compete in the global market. There should be a desire on the part of the organization, particularly its senior management, to adopt new ways of doing things.

In the context of corporate business enabled by IT, as Hammer and Champy (1994) have so concisely highlighted, IT can be a creative cause for new business processes rather than merely supporting existing business processes. Adopting a new technology can be used not only to simply automate what we do, but to do totally new things to dramatically improve what we do currently (for example, moving business practices to globalization). Choosing the appropriate technology

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products will assist the organization to feel confident in moving to a new business environment. In addition IT teams within organizations must select the most appropriate and flexible technology products that can be, if needed, tailored or customized to suit the organization's new environment and to fulfill its business and customer needs.

An organization's perception of technology deals with the way organizations usually select, value, and assess the new technology to be adopted. It must add value and help the organization solve its business problems and achieve its objectives. Technology is no value of its own; it has to be effectively integrated within the organization to increase its competitive edge (Zahn, 1995).

The main activities that are considered necessary to be carried out during this stage of adopting new technologies are:

- Identifying the appropriate and required technology products.
- Choosing the most proper and appropriate vendors.
- Professionally evaluating the selected products.
- Recommending the most suitable products with justifications.
- Acquiring the recommended products.
- Providing adequate education and training on the selected products.

Another important activity of this stage is providing the technical individuals with the adequate and appropriate education and full hands-on training to enhance their knowledge and skills, in order to efficiently and comfortably use and master the new technology tools such as creating and marinating the organizational Web site. Different training methods and techniques should be used to train people to accordingly satisfy their needs (Goldberg & Rubin, 1995). For example, in-house training and education should be conducted at the early stage of transformation to introduce the new technology to people.

From real-life projects experience, introducing an innovation or a new technology to people in their own environment for the first time has a positive impact on people's acceptance and increases the chance of their continuation. After passing the hard stage of gaining the people's acceptance and commitment, outside training sessions and e-learning can be more advantageous where people can be trained in a different environment, away from their daily business interruptions.

Special consideration should be given to selecting the most appropriate training company for the importance of their crucial role in accomplishing a successful transformation. The organization should assess and evaluate the training company on every possible aspect and characteristic, including experience, profes-

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sionalism, reputation, reliability, accountability, availability, suitability, and their ongoing support even after completion of the training courses.

Diffusion Stage

The diffusion stage mainly focuses on the deployment, spreading out, and enforcing of the new business practices and adopted technology across the entire organization. This stage usually starts when the previous stage (*adoption*) is almost complete. The major preconditions for the diffusion stage are acquiring and installing the adopted technology tools and techniques.

Before starting this stage people should be enthusiastic, feeling comfortable with the new business practices, reengineered business processes, and Internet technologies. Also they have received all the required and adequate professional education and training to enhance and upgrade their knowledge and skills to confidently think and work in the new global e-business way. At this point, the organization should be ready to embark on its first transformation pilot project for a particular product(s), area, or type of service. Further special training sessions, such as just-in-time, can be conducted during this stage to handhold employees and software the developers as they embark on their first project. The major activities of this stage are concerned with enforcing the new way of thinking and working in the global market environment.

During this stage, the transformation champion and the in-house support teams will be working together closely with everyone involved to offer any support at any time. These teams will be observing people as they are going through the first increment of the entire transformation process to report any difficulties or problems they might experience and plan to resolve them very quickly. For example, if these teams realized that they selected an inappropriate tool or technology, they may iterate back to the adoption stage to take an appropriate action to resolve the issue. The main activities considered necessary to be carried out during this stage are:

- Carefully selecting the first transformation project (first increment) as a start to get everyone familiar with the new business culture. This project must be important enough to gain management attention, and simple enough to implement so as to enhance people's self-confidence and enthusiasm.
- Providing full training and mentoring, such as Just-In-Time, for software application developers, system users, and customer service teams.
- Monitoring and supporting people during their first increment of the transformation process.
- Taking any appropriate decisions and/or actions when needed.

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- Encouraging and rewarding people for doing good work.
- Observing and documenting everything for evaluation and further improvement.
- Reporting progress and any other issues to management.

Retrospective Stage

In general retrospective (occasionally referred to as post-project review) is a formal review of any process or project that occurs at the end of that project so as to answer the following questions:

- Did we achieve what we set out to do?
- If not, where did we go wrong? And what should be done?
- If yes, what is next? How can we repeat what we have done again?
- What are the lessons learned and experience gained?
- Can we identify areas for improvements?

Retrospective (Kerth, 2001) is the final stage of the transformation process; it focuses on reviewing and examining the whole process to report the achievements against the original plans and also to answer the above questions. During this stage the organization should reward the people who were behind the transformation, such as the transition champions and in-house support teams, as a way of encouragement and appreciation.

Senior management should also announce and launch the new business changes in a formal manner in order to emphasis their importance and to highlight the achievement and their dedication to the new way of global e-business practices. A special celebration event organized by senior management inviting everyone within the organization, including customers, can be an effective way of getting the management message through loud and clear to everyone involved.

In summary the major activities of this stage are concerned with examining the whole process to identify and report the following:

- A collective understanding of what happened and why.
- All successful actions and steps to be repeated next time.
- Lessons learned and what to do differently next time.
- Any problems and/or difficulties encountered during the process.

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- Any lack of enthusiasm and/or self-confidence within individuals.
- All possible opportunities for further improvement.
- Acknowledgment and appreciation of accomplishments.
- Rewards for all champions involved with the transformation.
- Plans to announce and celebrate the completion of the transformation process to globalization.
- Beyond retrospective (continuous improvement).
- After carrying out the retrospective stage and arriving at the organization's desired state (global state), this desired state then becomes the organization's current state. By examining and analyzing the recommendation and the action list produced during the retrospective stage, the organization will be able to plan for perfection and further improvement. With a successful transformation to globalization the organization will feel confident and be capable of assessing and adopting new business opportunities that benefit the entire organization as a result of competing globally.

Summary

This chapter introduced the process of the organizational transformation to globalization and e-business environment along with related concepts, stages, and activities. The main goal of this chapter was to provide a broad understanding regarding the entire transformation process that can assist the reader in comprehending the effect of various factors such as human and organizational factors in details. This chapter discussed and covered the following transition concerns:

- What do we mean by the organizational transformation process to globalization?
- What and how can various factors influence the success of the whole transformation process?
- What are the main obstacles for the transition to globalization (ethical and technological)?
- How can we defeat these obstacles?
- What is the ultimate way to plan and manage the transformation process?
- How can we measure the outcomes or the end result of the entire process (evaluation and lessons learned)?

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Chapter IV

Transition from Manual to IT-Based Documents Transacting Business Process:

Performance Measurements System as the Key

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Abstract

A medium manufacturing firm had since beginning organized itself around quality-driven transactions in information documents. This learning in documents transaction helped it in scoring large gains in productivity, in cost-cutting, and in evolving a sound performance measurement system. This set the norms of work. However globalization opened up opportunities and threats. The old system had sufficient information technology (IT) backing but it failed in motivating employees adopting a global information challenge. In order to compete internationally through differentiated products with high quality, this firm then reengineered its manufacturing.

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Market information substituted quality as driver of information transactions. The goal of the project was to Web-enable the firm. The IT project had to define business transactions as the unit, which would define transactions in information in object language first and subsequently as transactions in documents. Changes were then brought at three levels: the first, essential level was based on business transactions among employees supporting the information system, which in turn generated business documents. Essential-level business transactions formed as a second level cared for the nuclei of business processes and could also constitute a new performance measurement system. Browser-enabled communication proved acceptable to employees who had previous learning in information transactions. The firm gained immensely through this novel mode of IT application.

Background

Liberalization and globalization have sent a message to entrepreneurs that opportunities for creating new business have opened up. There have been contrasting views saying that threats to business increased along with globalization. However for creating new business particularly in the form of a small venture, globalization offered distinct new dimensions in countries such as India. Threats exist for the old and established business. In consumer products new business such as in zip fasteners, which we will discuss now, opportunities came along by way of first opening the vision to a global competitive market and, second, by exposing an entrepreneur not so much as to resources but to business and technological opportunities. This is a story about three entrepreneurs who floated together, in the early years of globalization of Indian economy, a new small venture to manufacture zip fasteners. This narration testifies how with technological learning and adoption of information technology as well as contemporary management a newly created enterprise could be made a globally competitive entity. The hero, Mr. V, of this narration is one of the three entrepreneurs.

Mr. V understood that "learning before doing" was an effective and attractive mode compared to the "learning by doing." In the transformation of the small organization from a domestic-centered orientation to a globally looking IT-based medium-sized knowledge organization with globally distributed manufacturing facility in about a decade, information-learning proved to be a boon. Previous learning in information handling during the initial years when the enterprise was new and small was not IT-based. However knowledge on using information proved to be context-independent, and this knowledge helped the transition. This

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knowledge could not have become effective unless new and novel performance measures, based on contemporary understanding of performances in a knowledge setting, affected an incentive system, as it were, to induce the employees of this organization to bring previously learned fundamentals into the new IT setting. The new performance measurement, known as "motivational" measurement, was a system to induce and affect emotionally the people whom it was measuring. The system employed a principle called TASK through an information system (IS), designed to foster communication-based business transaction. This information systems-based management thus achieved three things: first, it utilized previous information learning based on documents transaction; second, it employed a motivational performance measurement system; and third, this motivational disposition was brought forth with the direct use of an IS designed on communication based business transaction as per the DEMO (Dynamic Essential Modeling of Organizations) model. Perhaps the ease of transition was facilitated further by the fact that the innovator of new organization was none other than the owner-entrepreneur, Mr. V, who shared with two other owners having similar dispensation the leadership of the passage of their privately held now medium-sized firm.

Background of the Firm

Close to the capital city of India, three entrepreneurs, two of whom had studied engineering together in a premier institution, launched the firm "G" to manufacture zip fasteners and components back in 1991. One of these three, Mr. V, while employed as an engineer with a large packaging firm close by, had invented a novel method of packaging that the firm could make into a very successful innovation. Mr. V was always restless with new ideas, and yet he has the rare combination of a matching meticulous care to the details of the system he is laying out. Novel idea, when matched with detailed systematization, often meets success. This spirited innovator organized the new unit by calling the two other partners. With their little capital and scarce knowledge of the exact method engineering of manufacturing zip fasteners, it was an uphill task. Technological manufacturing of zip was established, and there was no scope for novelty. However the organizational aspects and method engineering of the business process were altogether new to them. Novelty was there in the mode of this designing of an organization and its business processes. In an otherwise technologically mundane business, these entrepreneurs set up a knowledge organization whose key principle was management and learning of information. This was novel because knowledge organizations are common only in the technologically advanced areas while this business was on a backward technol-

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ogy, set up as a small unit with little capital, and the locally available human resources were largely illiterate. Novelty and the success of this enterprise are attributable to information-based learning, knowledge communicating, and motivated IT-based business transactions. In short its novelty has been in its organization.

The firm G has now two factories, one of which is in the Middle East, and more than 20 branch offices. In 1995 it had only one factory and six branch offices. Its gross turnover increased by more than five-fold during 1990-1995, and during 1995-2000 gross turnovers more than tripled (Table 1). The number of employees, however, did not progress in similar fashion. In fact while output was steadily rising, the number of employees not only failed to rise but also dropped significantly in three years. Worker productivity has been rising all these years. The number of employees had to rise again, however, in 1998-1999 when a new factory in the Middle East was set up.

We will, however, discuss changes in the domestic manufacturing set-up alone. Capital intensity of its manufacturing rose continuously. Most significantly upon which as a start-up, it has remained critically dependent. However cost saving played a significant part, and so also did the rising worker productivity. capacity utilization of these machineries, too, rose to reach near-cent percent utilization. Capacity utilization helped G in enlarging the internal accrual of funds This cost

Table 1. Manufacturing profile of G

Item	1991	1994	1996	1998
Gross turnover, Rs. Million, (approx. Rs. 45= U.S. $1)	16.3	65.2	92.4	210.2
Total value of machinery, Rs. Million	4.5	19.5	263.2	352.6
Total employees	142	295	270	290
Total salary bill, Rs. Million	0.4	8.2	22.1	34.6
Energy consumption, Rs. Million	0.4	19.6	31.3	56.8
Cost of marketing, Rs. Million	1.5	8.9	13.6	17.5
Cost of communication, Rs. Million	0.1	0.4	0.8	2.5
Capacity utilization, %	72.5	81.8	98.2	99

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saving has been affected through several measures (Table 2). Total input-inventory holding cost and the total finished holding cost have failed to rise in proportion to the turnover. Inventory has risen only marginally. Considering the impossibility of introducing a just-in-time system by a small enterprise located in a place where public information infrastructure is virtually absent, the achievement in G has been remarkable. Moreover costs were also saved by reducing the value of material rejection and by minimizing the necessary movements of pre-processed output (per unit of output) inside the factory as well as by optimizing the movement necessary for an output to reach the customer through carefully located branch offices. Cost of energy, too, did not rise in proportion to the growth in turnover.

Resources are critical. Initial capital was partly from the entrepreneurs' personal savings and was partly secured through a term loan from a development bank. A term loan is costly. In order to expand the business, these entrepreneurs decided such costs should be minimized. This alone would give them enough internal accrual. The stock market in India is poorly developed, and the prospect of raising capital through either an initial public offer (IPO) or through venture funding was simply zero. In fact the firm G since its inception has largely built upon internal accrual. It has used both internal accrual and term loan for new projects while for most others, such as for creating new markets, it has employed both cost saving and internal accrual (Table 3). The most important resource is, however, the people. Getting the right people on low wages was impossible, and in order to have internal accrual, G could not offer market-best salary or could not create jobs that only graduate engineers could do. G had to start recruiting fresh hands, not many of whom even had the right kind of education. Nearly 90 percent of their total staff has remained wage-earning workers, with the rest distributed between marketing and administration. However in recent years

Table 2. Cost aspects of G

Item	1991	1994	1996	1998
Total variable cost, Rs. Million, (approx. Rs. 45 = U.S. $1)	9.6	36.1	37.2	56.6
Total input-inventory holding cost, Rs. Million	1.8	0.6	3.7	3.8
Total finished output holding cost, Rs. Million	0.8	1.4	3.1	3.5
Total value of material rejection, Rs. Million	2.1	3.9	3.3	2.1

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percentages of total employees as wage-earning workers have come down and staff engaged in marketing has gone up, though not significantly. The innovative entrepreneur, Mr. V, quickly had to devise a production set-up that could simultaneously act as learning benches to these workers. Table 4 indicates the level of qualifications of the employees. Educational level at entry was in general so poor that Mr. V devised several schemes for OJT (on the job training), multi-skilling, design skill, repair and maintenance (RM) skill, and, above all, information-handling skill.

Learning to Undertake Information Transactions

Dynamic competence of an enterprise depends on both the skill base and the deployment dynamics of the skill base (Banerjee, 2003). In fact dynamics of deployment, which takes care of multi-tasking and multi-skilling, increases the competence significantly. The percentage of production workforce that have

Table 3. Sourcing of funds at G

Source	Capital machinery	New projects	Development & engineering	Creating new marketing	Commissioning R & D
Internal accrual	Yes	Yes	Yes	Yes	Yes
Sale of land, assets, other income	Yes				
Increasing equity base	Yes				
Term loan	Yes	Yes			
Short-term borrowal			Yes		
Financial management	Yes				
Cost saving	Yes		Yes		Yes

Table 4. Percentage of employees of G with educational background

Department	Degree in engineering/above	Diploma in engineering	ITI certificates (equivalent to technicians' certificate)	Less than ITI certificate
Design	10	30	30	30
Manufacturing	1	5	20	74

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been working on the same or very similar work stations continuously for the last two years was 94, for the last five years was 85, and for more than the last eight years was only 30. As a practice nearly half of the workforce switched over to new workstations in about six years. This took care of multi-skilling. About 10 percent of the workforce was deployed in multi-tasking. Most significantly, up to five percent of the workforce remained in general diverted for new products or new projects. Deployment dynamics takes a new dimension when skilled workers are redeployed from production to the repair and maintenance (RM) and vice-versa (Fischer, Jungeblut, & Rommermann, 1997). In fact about 50 percent of RM jobs are taken care of by workers right on the shop floor. However, in contrast to the Toyota system (Spear & Bowen, 1999) deployment of skilled workers from RM to marketing never took place, partly because marketing of zip fasteners does not involve the level of skill required in automobiles. Workers skilled on the shop floor often get promoted first to the RM department and hence to the design department As a result the skill component in design, fed by both considerations of manufacturability and production-maintenance, has remained very high, although the level of formally qualified graduate engineers in designing remained low. The firm G could not afford to hire engineers in hordes. Experience in manufacturing coupled with introduction to formal aspects of engineering and of the marketing enriched immensely the competence of G in launching of the "best" and "internationally competitive" own-designed range of products.

About 5 percent of the total employees are in design, of whom 20 percent have design experience of more than 10 years and about 50 percent have design experience of about five years. In fact G encouraged workers designing small inventions right on the shop floor by putting up a system of award and recognition. Qualification-wise only 10 percent of designers have degrees in engineering while about 60 percent have only licentiate (lower than a diploma, which is lower than a degree) or lower exposures. Capital expenditure and man-days spent in design have been fluctuating, increasing in the year prior to launch of a new product. About 10 percent of investment in capital machineries remains earmarked for design, including software required. Mr. V, when asked to rank the importance he attaches to the goals of design, forthrightly suggested customer demand as first, reliability as second, ergonomy as third, and minimal consumption of resources as fourth, disregarding such other values as considerations on competitors' products, features on incremental design, and so forth. However this department studies intensively products on offer by competitors and passes on this information to the manufacturing. The firm G could not naturally create its own R&D department. Instead, it has tied up with a nearby premier engineering research institution for both long-term and short-term designs, which require sophisticated theoretical inputs.

Mr. V, looking after the manufacturing (the other two entrepreneurial partners look after finance and marketing, respectively), sought to overcome the initial

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poor quality of human resources by emphasizing training the employees in manufacturing skill. Training intensity leapfrogged in some years; for example, while in 1995 one in three employees received training other than OJT, in 1996 this number exactly doubled. It doubled once again in 1998 before the firm G went in for its Middle East capacity. Mr. V ranked as most important training in the area of existing skill while ranking of next importance training in a related skill and of least importance training in a futuristic skill. However few of the workers from traditional background of craftspersonship suddenly appeared to Mr. V as repositories of skills, the much valued craft skills, and initially these workers joined in prototyping, to be joined in later by other trainees. Craft skill was taken up as a policy, an area where G must develop its own competency. Mr. V set aside funds for compensating expenses incurred by an employee in getting training in her own choice area from an outside agency. He encouraged experimentation by providing them with additional tool kits and with the guarantee that failures were not to be penalized, and he targeted communication skill as one of the most important policy goals in training. Employees mostly shared common mother tongue, however, there was little in common between them to share on conceptual or theoretical planes — employees had very diverse levels of skills in manufacturing. Mr. V clearly spelled out the importance of "manufacturing intelligence," a term he uses to connote an intelligence shared together through multiple modes of communications on ideas and skills in manufacturing competence. A close friend to Mr. V and also a consultant to G, who is a professor in statistical quality control, became a regular visitor, advising Mr. V on using varieties of visual tokens as symbols of information about quality, progress of job, problems, and so forth. The workbenches turned out to be festooned galleries transacting between them business transaction tokens.

Information Transaction with Market

However manufacturing intelligence could not be gathered only through setting up a detailed system of transaction in information (or its tokens) on the job progress. Business information transactions, Mr. V soon understood, ought to involve several tiers, first between marketing and manufacturing (Hausman & Montgomery, 1993), then between several processes in manufacturing, and between the past data and current performance referring to the goals, and on relative performance of an employee. In short information connectivity appears supreme, followed by linking sources of and accessibility to information. Market information came by deputing employees from the shop floor to trade fairs and exhibitions. The marketing team, however, was considered as the most important source, followed by the dealers' information, then that from the vendors/

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suppliers. Manufacturing information proper came by prototyping; customizing new product for specific customer need, which was followed later by mass marketing of the same; undertaking reverse engineering and generating test-data on certain products from competitors; and distributing information generated in R&D funded by G and undertaken by others and also while commissioning pilot plants/work-lines. Moreover close information transactional interfacing between manufacturing and the RM and the design enriched the information intensity of what Mr. V thought was manufacturing intelligence. Facilitation of such transactions happened through first setting up data bases on RM and on servicing and second through detailing manuals on both technical-servicing and the RM. documentation of routine production done later. In the early years business transactions of the employees were largely oral (about 90 percent). Over the years communication progressed through written, then more visual toward more symbolic or database. By 1998 at least one-fourth of the communication was based on the last mode through computer terminals and another quarter on the third mode.

It was crucial for firm G to locate its strategic competence. Once identified such competencies could be hastened up to secure strategic gains over the competitors (Varadarajan & Clark, 1994). The zip market in India is highly skewed. A large multinational corporation dominates both the global and the domestic market, and its products, though costlier compared to the run-of-the-mill products, have a very high quality. As a result its brand name is invincible. Firm G does not have a brand presence. Its resources are scarce and could not be channeled for creating a brand. On the other side of the spectrum, there are many domestic producers that offer unbranded inferior products at a much lower price. Moreover the domestic zip market is extremely differentiated because few consumers buy zips directly. Consumers depend on small retail tailors or small producers for products with zips stitched in. The number of such small shops runs in hundred of thousands. Demand for quality in the domestic market is not articulated enough. Price-quality considerations often disfavor quality. A competence in productive aspects alone, while it would allow it to mass produce at lower cost and compete with the lower-end bulk domestic producers, also would disallow the firm G to establish its future brand in the international market in competition with the leading multinational. However if G's competence is secured in quality and consequently in reliability as well as in diversity of products and in its ability to reach any parts of the globe, G would surely overcome the syndrome of a domestically entrenched sweat shop. Opportunities surely existed for G in the latter direction.

The choice to G was clear. Mr. V did not want to set up a sweatshop for making money. He thought that G should compete in quality with the dominant multinational. However, with small production set up, there was no scale economy and initially, during the period of learning, productivity too was rather low, resulting

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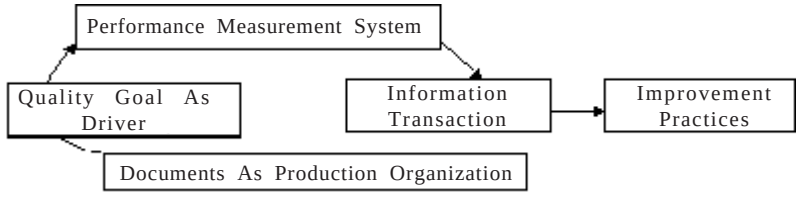
in higher cost of the end products. The nature of the market demanded setting up a large marketing team, but that was beyond the means. Developing franchisees, too, required large working funds. Mr. V therefore decided to put emphasis first on meeting and even surpassing the quality of the dominant international brand. He knew that his marketing thrust and his advertisement expenditure would not be able to establish their own brand in the immediate future. Quality as the engine should determine the production set-up and inter-alias the human resources performances measurement as well improvement practices (Figure 1). Productivity would remain a secondary outcome of this process. In the early years of G a quality department was set up. It established simultaneously quality circles through project teams, initiated rewards and recognition schemes, and began saving immediately. Savings through quality ensured substantial gains for a few years following 1994. Employees learned keeping and maintaining, also storing in a database the data on virtually each process step and stage in the manufacturing first, and then later on adding marketing as well.

Information as Key

Information appeared as the key to this direction of competency. Mr. V had by 1995 read literature on business process, its reengineering, and on IS. Now enlightened by his statistician friend and consultant, he realized that what he was trying to achieve, namely competence through manufacturing intelligence, was riveted to not locating or even recording information but rather in enhancing both information intensity and information transacting business processes and tasks. In reality the complex processes of information transfer that he had already set up by 1995 were the germination of business processes. Information transference across marketing, work stations in manufacturing, RM, design, commissioned R&D, servicing and quality were in germinal form, structuring process interfaces between these departmentalized entities. In other words regular information transactions had by then already bridged these extant sub-processes,

Figure 1. Quality as driver in business improvement



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creating the first embryonic notion of an integrated business driven by variable and multifarious informational transactions. Recognition of this embryonic phasewas urgently needed. Moreover Mr. V understood that such transactions were indeed being carried through the active agency of the employees of G. Mr. V, as narrated above, began implementing quickly a set of incentives that would recognize and facilitate these informational business transactions. Databases were set up. Incentives and even promotions were related with excellence in skills and in information communication. All this made information transaction the life force of G.

Agenda for Transformation

By the end of 1995 the board of G took a decisive step. It was decided that export should be the thrust area. Existing position in domestic market should be growing at the pace it has been growing, namely about 20 percent per annum. Share of export was nearly zero in 1994 but had an astronomical rise by more than 100 percent in 1995 (the growth appeared large because of the small volume of export in 1994). However the experience of 1995 proved strong. Moreover the export market had clients who procured in bulk, thereby reducing per-unit cost of marketing. In fact, as observed earlier, because of the fragmentation in the domestic market, per-unit cost of marketing in the domestic market was high. Further, lack of bulk order from this market prevented G from achieving scale economy and forced it to often run in batch mode. Export market, in contrast, opened up the possibility of scale economy, which in turn offered drastic cost reduction per unit and opened the possibility of opening up lines of manufacturing. This market was highly quality conscious, thus offering the needed challenge that Mr. V was looking for. Exporting offered several advantages: it paid prices for quality; cash earning was much higher, improving the cash flow; bulk orders provided volume and hence provided opportunity for building up a brand; and the market was structured, implying cost-to-market was low. Above all, because of higher competition in quality products, this market, while difficult to enter, was full of potential opportunities. Designing a new product with higher reliability and higher quality would establish now a higher assurance of acceptance. Moreover Mr. V's practice of customizing a product prior to launching the same for the mass market had better prospects because an international customer for bulk volume would be readily welcoming a customized, better-quality, newly designed product. The craft skill of G, assiduously inculcated amongst its workforce by Mr. V, now came in very handy. Prototyping and customization with craft skill put in designing imbued the export entrant G with a distinct competitive advantage over other long-standing international large manufacturers. The

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board of G understood when Mr. V explained that integration of business process at the enterprise level would remain amiss if G were to limit itself to the domestic market alone. Board of G decided that the next few years they would retain their domestic market while putting all their efforts in expanding share of export. Toward this, since now investments in quality and in business process would possibly reap cash and higher dividend, they decided to first set up a computerized browser-based information system for marketing. This would provide them with the much-needed access to the international market. Marketing would be responsive to the customers' queries and expectations on quality, and the entire information system would interface with the manual information documents transactions system through Mr. V's office.

Documents Transaction as the Base

Both Mr. V and his statistician friend/consultant were aware of concepts used in understanding a business as a documents transaction system (van Reijswoud, Mulder, & Dietz, 1999; Winograd, 1988). Information as the driver of the business gets transacted across roles played by individual members of an organization. Such information transactions take place through documents. With this belief and with knowledge of statistical quality control, it may be recalled, Mr. V and his friend together set up the production workstations, which were highly dependent on communications of information stored in several media. Each such workstation acted as a generator and receptor of information. Documents were not necessarily in the form of a physical missive but were frames containing a scripted or coherent bunch of information communicable in several modes. By 1995 Mr. V had set up the most detailed document transaction system. They did not have a single computer before 1994. Excepting a handful including Mr. V, employees had no knowledge of transacting information through computer. All the documents were information-intensive, often based on manual recording and oral or written or even coded documents used to be transferred across the production set-up, driving, as it were, the production. This document-driven production was slow initially, and the personnel took time to learn transacting information as the driver of the production and as the controller ensuring the quality of the output (Porter & Millar, 1985). However while internally among the groups of workstations the information document transaction could set up a set of business processes, it was failing in meeting the ultimate criterion. Customer satisfaction as the defining boundary to a business process integrated at the level of enterprise was still amiss. The domestic market being unorganized, G's marketing team was unable to locate the type customer, information from whom ought to have been driving the internal information document transaction system.

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There were two more hurdles. Employees who were happily transacting business information verbally or in other physical modes began feeling discomfitures with the evolving demands of databased or non-physical modes of transactions, especially those relating them transactionally to the unknown and not as-of-yet experienced domains of global customers. The second hurdle was that to the management, in particular to Mr. V, it was appearing that while information-driven processes at G appeared to be better than its domestic sweatshop competitors, this level of information intensity was not perhaps sufficient to enable G as an international brand offering competition to the reigning multinational. Option to G was to reorder its human resources system with new incentives and new knowledge-driven focus in order to overcome the first hurdle and to hire an international consultant for benchmarking its processes. An international consultant alone can offer international benchmarking data. The first option was costly but achievable, but the second option would cost G very dearly, and G finances did not permit it.

Regionally Benchmarking Manufacturing Intelligence

An opportunity came by around 1995-1996. A management research institute from the same city had at that time launched a research project on the manufacturing competence of industries in that region, with one of the research goals as creating a benchmark among firms belonging to different sectors of industry sharing the same location on indicators of manufacturing competence. Mr. V, understood the implication of the study and gladly agreed to cooperate

Table 5. Indicators of competence: Firm G in comparison

Firm	Enterprise informatiz ation	External informati on connectiv ity	Employee accessing external informati on	Information employed for competition	Design skill employed for competition	Strategic use of advanced design	Quality maintaina bility	Skill-shopfloor-RM integratio n
G	0.5	0.5	0.15	0.5	0.4	0.6	1	0.02
1	0.125	0.25	0.0025	NA	0.3	0	0.3	NA
2	0.5	NA	0.5	NA	NA	0	1	0.18
3	0.125	0.5	NA	NA	0.1	0	NA	NA
4	NA	NA	0.01	0.5	0.3	NA	1	0.01
5	1	1	0.2	0.25	0.5	NA	NA	NA
6	0.25	NA	NA	1	0.2	0	1	0.02
7	0.25	0.5	0.0125	0.5	NA	11	NA	0.03
8	NA	0.25	0.025	0.5	0.1	0.2	1	0.03
9	0.5	0.5	NA	0.5	0.4	0	0.5	0.12
10	NA	0.5	NA	0.5	0.2	0.3	0.5	0.01

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with the research team. He thought that in lieu of international benchmark data, G could now be compared with other firms that were either units of multinationals or were globally marketing their products. The result of this research survey was revealing. In almost all the relevant indicators of competence, G was either at the top or close to it. Table 5 compares eight indicators of G with 10 other firms from the same region manufacturing various other products such as automobile, machine tools, haulage, and so forth. Values of three indicators in connection with employment of databases, computers, and information as such in symbolic mode have been compared, as have indicators on application of information for competition, design skill employed for competition, strategic use of advanced design, the integration between skill-shop floor and the RM, and maintenance of quality.

Indicator on enterprise informatization indicates whether a firm maintains in-house databases, maintains enterprise-wide IS, and whether it has undertaken business process reengineering. G had a value above the mean (the distribution of values having standard deviation at 0.3 for 53 firms) and only one firm had a value higher than G. Similarly the next indicator on external information connectivity based on a firm's use of EDI, Web site, and multimedia internal to the organization shows that G is once again above the mean (with standard deviation of 0.2 for 53 firms). Indicator on employee accessing external information is based on percentage of employees accessing or using databases, on the firm's use of commercial data base search (such as on a patent), and on the firm's use of commercial engineering databases. Here again G maintained its above-average competency. Another indicator that measures the use of information for competitive advantage is based on a firm's use of reverse engineering and on the firm's data generation on competitors, however, shows G has a value a little lower than the mean (for 53 firms). Three other indicators on aspects of manufacturing competence capture use of design skill for competition, strategic use of advanced design, and the integration between shop floor, RM, and the general skill pool. In all these three indicators, G maintained a value rather high in comparison to the mean (of 53 firms). The last indicator in Table 5 is about firm's competence in maintaining its quality profile; it is based on whether the RM employees impart the OJT, whether the firm has a policy in place on ensuring quality, and whether employees routinely generate and record data on quality. G maintains the highest value here.

By 1996's end G had access to the benchmark and to the general states of affairs regarding indicators of manufacturing competence in the region. This data revealed to Mr. V that much was to be done. In preparation to becoming global, Mr. V had already launched in 1996 preparations on several databases. These were on engineering, manufacturing, inventory, and market. G began using in 1996, again as preparatory to be global, Internet, paging, and mobile telephony. Its cost of communications, which was Rs. 0.4 million (approx. U.S. $0.1 million) in 1994-1995 shot up to nearly double that to a figure of 0.75 million (approx. U.S.

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$0.18 million) in 1995/96. This increased to above Rs. 2.5 million (U.S $0.62 million) by 1998-1999. In 1996 G went in for purchasing software for the first time; it had earlier in use software developed for custom use. The work for LAN was launched end of 1996. The idea on the Web site was not yet moot. Mr. V, looking at the comparative statistics and having attended, along with several other entrepreneurs/managers, several brain-storming workshops organized by the research institute, realized that the earlier strategy of quality-driven information transactions in G could unfortunately encompass the manufacturing proper alone — the integration of manufacturing and marketing through information transacting businesses remained unattained. Moreover it was now apparent to him that while previous modes of transactions and training and other human resources aspects were well-suited to an environment having little symbolic computerized information, now, with computerization of information transactions, all this needed drastic overhaul. It was indicative enough that a strategic change was necessary.

Performance Measurement System

Aspects of measuring and motivating human resources in the forthcoming changed situation were showing signs of strain. The previous harmony between Mr. V and his employees, that had grown together with the growth of G somewhat organically, now began showing signs of displeasure if not of rupture. The previous system, with its emphases on craft skill, verbal transactions, performance measurement by each for oneself, and on collectively sharing the comparative performance profile, enjoyed bonhomie. Measurement of performance did not drive outcomes inconsistent with the intentions of the system (Austin, Larkey, & Royo, 1998). The earlier system was simple because measurement of performance of an individual was possible as jobs were broken into tasks being performed by an individual; then any measured output could be attributed causally to the actions undertaken by an individual or a group and measured data could be used evaluatively, implying that evaluation would lead to emergence of a set of desired norms. The last, namely evaluability, is important. A performance measurement must, even if not intended, set up a norm. Norms that get set up display incentives for certain kinds of jobs and tasks and employees would be directed to undertaking those jobs and tasks, even though the measurement was intended for evaluating the efficacy of some other existing norms. These later norms are the written rules in the codebooks whereas the measurement system institutes another norm unwittingly. The system would be considered dysfunctional.

With the new emerging situation, the previously existing separation between individual jobs and tasks began disappearing, giving way to a situation where many employees shared a single outcome and, conversely, in many outcomes

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there emerged the contribution from a single employee. An individual began appearing as a set of roles. Consequently measuring the productivity of a single individual in the previous mode appeared more and more difficult. Further, as a result of this role, mixing attributability of the measurement system too suffered; it was also difficult to attribute causally what factor or which individual was responsible for the outcome. Finally the previous system of measurement, through its evaluability, had set up a set of norms, which the employees had been happily consenting to. Now, with new types of jobs, new modes of information transactions seeping in — it became difficult to locate a standards of performance against which the rest could be benchmarked. This was evident in the research institute's reporting. In the previous system owing to bonhomie, employees "willingly" cooperated in generating and sharing data on performance whereas in the newly emerging situation, with the happy senses lost, it was "irrational" to "require that workers engage in a behavior that is fundamentally irrational on a self-interested individual basis" (Austin et al., op cit:7). Mr. V could see that workers desired a different system. The firm G in his vision continued to be in manufacturing, and he was designing strategies for acquiring the manufacturing intelligence. In all this employees had to willingly participate to transform G into a knowledge organization. A measurement system and a new norm, which could institute motivation in the employees, was what Mr. V was now looking for.

Manufacturing Marketing Interface

This affair seemed even more complicated because now the manufacturing had to be integrated with the marketing, and if a business process reengineering were to be undertaken in order to drive manufacturing through the market-provided information, the cocooned complacence existing till that date in manufacturing would be lost for good. The previous strategy was similar to the Japanese style emphasizing cost reduction while increasing or at least ensuring quality (quality as the driver). Its priorities were cost, quality, dependability, short-term flexibility, and continuous innovation (Hausman & Montgomery, 1993). The market demanded price, quality, availability, variety, and features. Mr. V was looking after manufacturing and another director was looking after the marketing. Quality-driven cost reduction as the business model served several goals: less working capital, less outgo on borrowing, profit-making though competitive cost-based pricing, incremental innovation through quality maintenance, and product variety through initially customizing. Integration between marketing and manufacturing was fracture-less.

However, if the market were to drive production and if market were to set up units of business transactions in information with such a desirable seamless interface that the two departments appeared as one, the previous strategy of

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cost-cutting and so forth would be given up. Consequently hero workers — the role models who saved costs, who incrementally innovated and who targeted manufacturing as the outpost — would now have to listen to customers' information, design accordingly, and need not look at cost saving alone. G could, in the international market, now have the opportunity to look beyond cost while pricing, and its profit avenues seemed now different. The international customers would look for more information about the dependability and reliability of not the product alone but more about the manufacturing. Their gaze inside manufacturing and their demanding of alternate manufacturing scenarios turned upside down both the interface bridging marketing-manufacturing and the human relations system. Mr. V hoped that computerized information-based business transactions would offer the needed strategic solution because he was confident that previous learning in information handling would direct the new learning.

Process of Change

The board of G, consisting of the three entrepreneur directors, met for days, consulted the statistician, and looked closely into existing literature on modern management. It was decided that G should set a few business goals: to export a minimum of one-third of turnover by three years while maintaining the current growth rate in turnover; to set up another plant primarily for export in the Middle East by two years; to not increase existing employee strength — in other words, to increase proportionately employee productivity; to enhance quality, reliability, and increase product varieties by minimum three-fold in the coming three years; and to achieve all this by maximum internal accrual of resources and minimal borrowal from term-lending institutions. Overall G hoped by 1999-2000 be in a position to commence establishing its brand name. These were rather tough business goals. Mr. V did not have immediate answers to the means he wanted to employ; he had inklings, though. He thought about strategic choices between technology as driver, quality as driver, or people as driver. He had already consulted several strategic change management literatures; in particular he referred to the MIT framework (Scott-Morton, 1991) and the Fujitsu framework (Yetton, Johnson, & Craig, 1994). Change management in a small and medium enterprise located in a developing country (Chang & Powell, 1998), Mr. V understood, had its own peculiarities. Both the MIT and the Fujitsu framework had referred to large corporations with very rich technological and other resources base and located in an advanced technology competition milieu, and these corporations were operating in advanced technology products. G did not have any of these. MIT-Fujitsu frameworks compared differences in sequences and in the choice of the driving element out of strategy, structure, technology,

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management processes, and individuals and their roles. However, for a small and young business such as G, structure of business, its management processes, and business strategy as a separate element could not be considered meaningful. In fact business structure of G was only evolving and taking shape along with an inseparable management process. Mr. V identified only three aspects, namely, technology, quality, and people. Quality had been the driver and in a certain sense had been also the management process of G. Technology that G had been using was based on information transaction as the principle, albeit without using IT as its instrumentality.

Strategic Change Through IT

Roger and Elvin (1999) differentiated between four modes of strategic deployment of IT. A change management may need IT to initiate, facilitate, support, or bring in unplanned changes from the market. The intervention process in their scheme was formed by the context, the outcome, the business content, and the IT content. Mr. V had been facilitating changes in G through business transactions of information in a manner that was slowly appropriating IT in order to become an IT-based IS. The firm G thus did not require IT to initiate change. IT as the channel of bringing in market led to unexpected transformations inside G that were not suited for G. The choice was between the two: IT as facilitator or as support. The board as a set of business goals had decided the outcome of the change already. Mr. V's thoughts thus hovered around the context (internal and external) of G and the business content of the change — he thought these two, namely context and business content, should decide IT content. The external context was globalization and international competition. The internal context was set by employee knowledge in business transaction of information and growing dissent, or at least disenchantment, with the prevailing performance measurement system, which was now setting business norms at cross purpose with the business goals of G. Business content had been set by goal of export, changing from quality as driver to customer as driver with the constraint that employee productivity would have to rise significantly. Reflecting back on his own approach, Mr. V could see that he had begun using IT as the support for the past year. G had a rising communication cost doubling, every year; it had launched LAN; 70 percent of its employees had been referring to internal databases at some point; there were several computer terminals; and in the preceding two years G first customized software and then purchased more software for its inventory. IT had begun supporting change. However, G required a radical strategic change. Mr. V therefore thought of IT as a facilitator of strategic change.

Looking back Mr. V realized what had been his achievement in setting up a document-based information transaction system as the source of improvements

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in the business (Figure 1) had with its success become a source of inertia (Tripsas & Gavetti, 2000). Capabilities of its personnel as captured through its performance measurement system, in particular the coordination patterns and the norms as how best to achieve business coordination, had after its initial success acquired dead weight. If at this phase IT continued to be brought in, as G had been inducting computers over nearly two years since 1994-1995, this deadweight inertia would set up in documents transactions and the corresponding measurement system would get stabilized. IT, he was afraid, instead of bringing about changes radically and strategically, would support only continuous changes — a mode in which any inertial system keeps changing. To facilitate change he was looking for a radical reversal. Mr. V thought about reversing the sequence of business transformation. A business organization, he believed, should behave like an organic being who gets transformed as it continues its living. A business while transacting business should receive the fillip to change from within the mode of transacting that business. Here ideas came from several sources, and it was not apparent to him either, although the shape that this new sequence slowly took up can be schematically presented as in Figure 2.

His ideas on change and business process designing were very similar to the DEMO (van Reijswoud et al., 1999). The core of business, its essential function, is business transaction through which the business content takes up shape. This essential level (Figure 3) is supported through information transaction. G acquired informational competence through learning to undertake such informational transactions. The information level gets captured for structural reasons of the business in the form of documented structure, created through documentation.

Figure 2. Transformation in reverse sequence

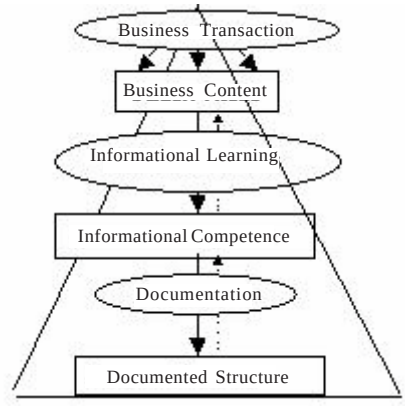

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Figure 3. Level, goal and activities of changes in G

Level	Goal	Activities
Essential level	Coordination by business transaction	Transaction types, actors, results
Information level	Change information processors	Information sent, received, derived
Documentation level	Automate document movements	Production, storage, transportation, destruction of documents

Business Transaction as Unit of Business Process

Mr. V faced an excessive load. However putting a very hard-working team close to Mr. V, could effect some modest changes in both the nature of the documents and in their process set-up, keeping in mind that changes in the manual documents were to be minimal and work schedules did not suffer a setback. G had by then several databases in use through several computer terminals. A number of inventory documents were created, stored, retrieved, and even destroyed as computerized documents. However many documentations on the shop floor or in liaising with design, RM, and the marketing or administration were in hard copies; in manufacturing many documents were tokens carrying information on quality and other details. The first important aspect of the change was thus how to minimize the turbulence created by reversing the sequence described above. So far documents had carried the cued information, and documents thus structured the information-based business transaction. In the present mode, if business transactions have to constitute dynamically the documents, entirely new sets of documents would be demanded, created, stored, and so forth. Meetings and exposures of the employees to this new mode largely solved changing over the problem. Mr. V and his close team understood that active human agency, when willing, could adopt to any innovation in no time. However employees sensed a trouble — the new system implied a radical change in the performance measurement system. Resistance formed soon. We will get back to this aspect soon. Turbulence could be kept to the minimum through acquiring, finally, the concurrence of all. The board thought that because of both scarcity of capital and rising demand on investment owing to export orientation, the marketing set-up should launch the browser-based system immediately and initially through a service provider. After about a year, this same should be based on its own server, which even later, around 1998-1999, should include the production set-up documents transaction system. The board was expecting a steady rise in export given their quality, which often was better than the dominant international brand, and this rising export would solve the cash-flow problem. With good cash,

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expanding the production set-up could raise production quantity. Resource accrual thus made would enable an enterprise-wide IS by 1999. Prior to that ERP modules could be purchased and deployed.

A few Indian firms were selling ERP on the Internet, where a firm could buy one or two modules at a time. Mr. V was hesitant in procuring ERP; he understood ERP as a structured set of documents transacting system. He was on the move to dismantle priority of documents in structuring a business. Documents transaction must be final outcome, and with process changes in the business, the respective documents transaction system, too, should be required to be restructured. There was a perceived contrast in the change management philosophy. The other two members of the board were, however, for ERP initially since they had seen ERP improving performances in other regional firms. As a compromise, a first set of modules was bought for the inventory. Inventory documentation of G was already using customized software. Even after customizing the newly bought module to G's need, this new documents structure caused a series of problems. Quickly, seeing the turmoil in the production, the board sat together and discontinued further introduction of ERP modules, empowering Mr. V alone in this entire matter of change management.

Designing IS and Documents on Transactions

The project of Mr. V's turned out to be a business process reengineering. The customer, in lieu of quality parameters, was now the sender of information. This information, considered the business content, had to be established through reciprocating business transactions inside G. Such a transaction is composed of three phases: ordering, in which two role-actors agree on executing a future action; executing, in which the task gets executed; and, resultant, the roles negotiate a concurrence on the acceptability of the outcome. This transaction therefore is based on communication. Each transaction re/constitutes the business relations in the visible social space of G and, hence, a transaction fundamentally re/constitutes the business process. The same transaction in the object world of IS re/constitutes the "facts" of IS transactions. This fact of concurrence in a transaction necessarily can coordinate the business through re/constituting both business-processes based on social transactions and the information transaction processes based in the world of IS. The former of these two referring to re/constitution of business processes takes place at the essential level (Figure 3). The latter refers to each role-actor as an information processor, taking place at the information level in object language. This philosophy, as adopted by Mr. V, then constitutes each time a new customer demand arrives, the fundamental business transactions at the social level of job/task coordination, and, thereby, business process too gets reengineered. The driver of changes in coordination that are in the business process is now the customer.

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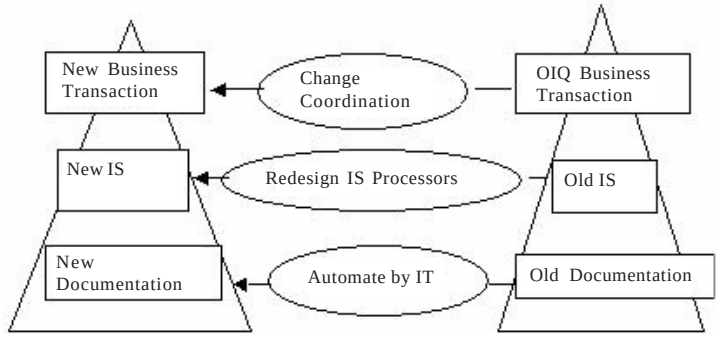
Figure 4. Organizational transformation at threee levels



A change in the social-level business transaction reorders and reconfigures each information processor, which at the social level is a role-actor and at the information level is captured in object language (Figure 4).

A change is reflected in the information content and the relational aspect of any information transaction. Employees of G were used to information handling but in a non-symbolic mode. Previously changes in information transactions were visible in changes in tokens or cues, for example. However the object language level changes in information are abstract and invisible. This change was significant, and employees reacted to the new situation. However, previous learning helped them in getting over this transition quickly to abstract reality. Employees soon responded by adopting abstract informational learning. In this new mode each role is an information processor who sends, receives, stores, processes, and derives (new conclusions). This is how the new IS takes shape through being driven by the essential level-business process transactions. Once this IS identifies an information packet, the same is compared to its existing system of documents and, if required, some old documents are destroyed, some created, some stored or dispatched. This document level appears as the final outcome of changes in the business transactions/processes. Changes in documentation, which previously were the driver, are now the driven final resultant. An ERP module could now be harmonized with this documentation.

Reengineering and Productivity

Mr. V continued on this project for about two years, until about 1999. A local software firm developed software for this. Customization took place through regular interactions between the team close to Mr. V. This team had experience in customization of software, which helped it set with greater clarity the required

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parameters. Expenditure on this software was at an affordable level. G by then had through a server its own Web site, and its marketing team greatly benefited from interactions with prospective customers through this site. Branch offices of G began communicating through e-mail, which before around 1996 was the privilege of select top few. This site did not afford, however, any capability to transact in e-commerce. Electronic inquiries were replied to electronically and pursued after through physically. Market information from such electronic and physical sources then entered the IS of G. Immediately thereafter, in 1998, all the terminals through the LAN were browser-connected. Market information could be sent directly to or accessed by the batches of production employees, the design employees, the finance, and so forth. Hardware purchases, primarily of computer terminals, did not cost much. In manufacturing, where several batches were now replacing the previous single line, each batch was given access through a terminal. Similarly RM and design, too, were provided with several terminals, and all such terminal got connected through an enhanced version of the previously existing LAN. This physical hardware platform did not cost much because hardware prices were down. Total cost was well within G's budget. The customized software, costing nearly as much as that of the entire hardware, had integrated within itself the earlier customized software on inventory. Next, Mr. V thought around early 1999, should be interfacing this new IS with the ERP module bought earlier. Interfacing with such ERP modules, it was thought, would take the employee productivity level much higher. It may be noted that during this nearly two-year period of changing over to the new business-transaction driven IS and finally the documents system, raising productivity (which was the business goal) took a back seat. However, with the new IS documents being created through changes in business process, constitutive transactions were conveyed through the changes in information processor status. Such documents reflecting both business transactions and information transactions could now be dovetailed to the ERP modularized documents transactions system, the latter holding the prospect of much greater productivity. Once this is achieved, Mr. V would ensure both a changed G and the business goal of higher productivity.

Soon share of export in the total turnover increased, and by 1999 nearly one-third of production went in for the international market. The production system now switched over from manual to an IT-based documents transaction system. Increased workload on the production employees and demands of transition from pure manual to browser-interfaced documents transaction added some new dimensions to the business process and its performance measurement system. Workers were nervous because they treaded on uncertain ground. Mr. V could understand that G was to be made into a knowledge organization. Employees were exposed to not just an information system based on computer but to a new business process with novel features of performance measurement. Without the latter business process transactions, defining IS first and documentation there-

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after would fail. The essential level, it may be recalled, re/defines each business transaction corresponding to the arrival of information from the market. Each such transaction taking place between either members from the same group of employees or across different groups of employees defines the constituent fundamental of a new business content. Performance of an employee is inextricably interdependent, dependent on concurrence and communicative performance. A tangible outcome, which can be measured, is the joint effort of several. Both measurability and attributability have changed; the old direct measurement based on the old documentation thus failed. The evaluability, which judges the "normative adequacy" of the measured output, failed, too.

Performance Measurement as Key to Reengineering

Most importantly, with groups of employees working on batch products and employees defining on their own the desired types, the quality and quantities of the output – in short, employees defining on their own both business content and the respective business processes, the corresponding information to be transacted in relevant documentations — this all demanded that, first, Mr. V become only a facilitator and cease being an observer-monitor, and second, the employees get motivated to work. Motivation assumed most importance. The work was in knowledge since new batch products were getting designed frequently. Work involves not simply knowing and abiding by "rules" or "routines;" instead, work involves a "talent," a "skill," and "knowledge differentials" (abbreviated as 'TASK' by Austin & Larkey, 2002). A talent refers to creative aspects and to the innate knowledge that, when supported by skills such as in machining or in numerical machine designing, gets the shape of new products of quality. However, a work involves a transaction and a concurrence, implying that the two persons in transactions must continue to maintain a knowledge differential. Homogeneity in skills or knowledge would imply going back to a Taylorized line production. Mr. V had to grasp these three dimensions of measurement rather quickly. He and the team closest to him racked their brains and suddenly realized that the key to measurement was at the essential level coordination of business transactions.

The transaction can take place only when knowledge differentials exist, the talent shapes its content, and the concurrence between the two roles in a transaction following the "assumed" completion of the task can take place through skills. Thus a transaction can convey fundamental information on new mode of measurement. However they also realized that they were going to measure a role performance and not an individual's performance. Conversely several roles might take up a single role by a single individual. Therefore, with essential-level measurement, role performances could be measured. Further

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norms of performance would now be set by satisfying the customer and not as previously, by sticking to quality imperatives. Given this understanding, Mr. V and the close team called in the software developer in late 1998. It was around the time the DEMO-type software was nearing its completion. A next project was launched. This project would take up a set of information from the essential level, which so far had not been considered for defining the roles of information processors (and, consequently, the resultant documents). This new set would be based on measuring TASK. This TASK-based information would get routinely declared or announced through the terminals attached to the role-groups in the batches — employees would thus be provided information regularly on one's own performance, on one's achievement as well as what remains to be undertaken, and, finally, on the normative performance by any norm-setting role-actor(s). This was a process performance measurement system (PPMS) based on workflow system (Kueng & Krahn, 1999).

Immediately upon launching this measurement system, Mr. V and this team held general body meetings with the employees, explaining the changes conceived. This announcement appeared as a great relief as well as holding great expectations that it would not take long to become an ideal solution, as it were. The acrimony that was looming gave way to a new level of cooperative working. The development phase of software on PPMS regularly involved a mass of employees, who participated and suggested several alterations and improvement. However, in 1999, a preliminary version only could be implemented. Mr. V, however, did not take long to adapt to his new role as the facilitator of business transaction and of role performances. The year 1999 proved to be a watershed in the history of G.

Challenges to the Organization

Business process changes happened primarily in the manufacturing and the interfaces of manufacturing with marketing. Mr. V's foresight, deep understanding, and exposure to current literature of management helped him and, through him, the team in manufacturing the insight into new and novel manner of defining business transactions based business content. However the two other directors and the departments reporting to them, namely, branch offices, marketing, finance, administration, and public relations, were still following work methods pertaining to the old order. They had not yet identified the three levels: essential, information, and documents. They were following IT-based documents transfer. These departments, too, bought computers, and after 1999 some, such as finance, bought the relevant ERP modules too. However these computers continued following old documentation system until as late as 1999. This

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appeared as unpromising results in 2000, reflecting the mismatch that occurred in the year 1999. Business at G could not develop its business content in full through its novel customer-driven manufacturing set up alone. The board realized business was integration.

Ironically and contrary to ordinary experience, manufacturing had reengineered itself first while finance and marketing lagged behind. Mr. V and the board quickly realized these shortcomings. Entrepreneurial coordination was needed, and the first task was to identify the essential levels in those business processes under the control of the other two directors. The question was raised and again by Mr. V about the observable variables that were not just physical and tangible. Key to understanding transaction remained with this observable. Second was to identify what could constitute the motivation or the system of incentives. Third, what had been described as TASK (*talent, skill and knowledge differentials*) — that is, individual exploration, and initiative in creating new opportunities and solving them in lieu of one's abiding by a plan of work — whether the TASK of manufacturing should now be the backbone of IT-based documents transacting business processes in all other departments. Could the same principle hold in finance and administration, and above all in marketing? This recognition would result into a reconfiguration of the information system, resulting in more of end-user computing. Would the other directors and their senior colleagues in marketing and finance devolve most authority down the line? Would they like to empower as much, and would they now assume the roles of coordinators and facilitators? Mr. V had already taken up the role of information coordinator in the manufacturing. Both motivational measurement and informational measurement systems were provided room in the scheme of things proposed by Mr. V. However he did not propose a system identical to manufacturing. Integration of business at G should imply that sub-processes in the previously existing departmental modes retain certain uniqueness and not retain any isolation. Differentials maintained through talents, skills learned in those sub-processes hitherto, should prove as asset. Integration should target keeping such differentials as were integrable through dynamic interfaces. Some solutions were conceived in early 2000.

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Chapter V

Global E-Business Alliances:
The Socio-Cultural Perspective, Influence, and Mitigation

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Abstract

With increasing ability to interact globally through the electronic medium, businesses are able to tap into newer business opportunities externally as well as capitalize internally on pools of resources and talents spread across the globe. However one of the major hindrances to the utilisation of these opportunities and talents through global alliances is cross-cultural issues. While technology renders the geographical boundaries redundant, it aggrandizes the chasms in socio-cultural value systems of physically disparate alliance partners. This chapter discusses the gamut of global e-business alliance: the primary reasons for their needs, their socio-cultural perspective, and the various factors that influence such alliances. Finally the corresponding mitigating approaches to those negatively influencing factors are suggested.

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Introduction

Electronic commerce requires sound business alliances. This is because electronic business can reach far and wide, transgressing geo-political boundaries instantaneously. In order to succeed in a global electronic business, it is essential to create alliances that are not merely of the electronic world but also based around the physical world. This is so because however easy it might be to form an electronic link between two businesses, there are numerous non-technical factors, such as social, political, cultural (Laudon & Laudon, 2002), and legal, that influence the outcome of global e-business alliances. In fact it is the balance between these non-technical factors that usually determines the success or failure of a global e-business alliance, as the technical factors are a "given" for these alliances. Understanding the socio-cultural perspective resulting from the non-technical factors is at the heart of e-business alliances in this communication age (Unhelkar, 2003a). However while globalization continues to promote organizations to ascend their technological capabilities, when it comes to physical (non-technical) alliances, as already mentioned, organizations stumble across relatively unexpected challenges in terms of cultural and sociological issues (Unhelkar, 2003c). Increasing competitive pressures make it imperative that companies develop new capabilities in providing timely goods and services, improve internal management of their businesses, and decrease costs. These requirements are better served by strategic alliances that bring together disparate skills, capabilities, resources, and environments. Interestingly the electronic world not only creates the need for this synergy but also facilitates bringing these skills together, which would otherwise not have been possible in mere physical alliances. Despite their potential benefits, the majority of alliances do not survive even in the early periods. According to some statistics 55 percent of alliances fall apart within three years; only 23 percent of them can barely cover the costs of forming those alliances in the first place. One of the major reasons for this failure appears to be the inability of the organizations to accommodate differing cultures (Grambs & Zerbib, 2000) These cultural differences are not merely socio-cultural but also related to corporate cultures and political cultures (Laudon & Laudon, 2002; Unhelkar, 2003c). Thus for an effective globalization process, it is crucial that a fine balance between electronic expansion and creation of physical alliances with global trading partners is achieved.

The fact that the socio-cultural issues are now gaining importance in the e-business world is not surprising. This is because these "soft" issues usually follow the successful handling of technological and methodological issues within any process (Unhelkar, 2003b). Therefore, in the context of processes for globalization and related global information system (GIS) issues, programming for Web sites (technology) and modeling within the context of software

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engineering (methodology) are challenges surpassed by cultural and social issues. This chapter considers the major reasons and issues in setting up global alliances in the electronic world, the factors that influence such alliances, and what can be done to ameliorate the cultural problems that hamper growth and prosperity of these alliances.

Reason for Global E-Business Alliances

As mentioned earlier, when organizations form wider electronic alliances it becomes imperative for them to also consider the issues related to physical alliances. This is especially true when the e-business alliance is global, spanning across geo-political borders wherein technological capabilities to interact with each other need to be supported by the physical capability to service clients and business partners. A global alliance effectively builds on the possibilities offered by two companies that are able to electronically communicate and that have value to offer to each other. Usually the underlying principle for electronic business alliances that also require physical alliance capabilities is that each member of the business alliance has something to offer that is complimentary to the other across geo-political borders. It usually turns out that one organization is a technically savvy global aspirant that is trying to reach across the borders. However, due to numerous factors such as social, cultural, legal, and political, the organization is unable to transcend its borders. This is when the electronic commerce world facilitates formation of these alliances, as it is easier to communicate electronically across boundaries than it is to do so physically. However the central point expounded in this chapter is that such alliances, although electronically (technologically) easily conceivable, require a corresponding understanding of the physical alliances for them to succeed. Therefore whenever such alliances are formed, it is imperative that stakeholders and players in these partnering organizations quickly understand and establish working relationships that transgress the socio-cultural borders so evident in physical alliances. If employees and managers can effectively adopt different cultures, the companies benefit a lot from those cultures (Gupta, 2000). In fact, there are a number of benefits accorded to the electronic business alliances with a physical component in them that continues to promote the creation and sustenance of these alliances. Some of the major advantages resulting from global e-business alliances are as listed below (but not limited only to this list).

- Knowledge capitalization
- Knowledge sharing

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- Market expansion
- Customer service enhancement
- Risk apportionment
- Outsourcing
- Legal and tax advantages

We undertake a more detailed discussion of these reasons with an aim of creating a good background understanding of the causes of these alliances. Thereafter we proceed to discuss the issues arising out of these alliances and the approach to mitigate them.

Knowledge Capitalization

When two organizations from different regions come together, they invariably bring rich knowledge and know-how in terms of products and services offered. Collaborations between people belonging to these organizations, reinforced by information flow, makes it possible for them to share knowledge, thereby enhancing the overall pool of expertise in the organization. This can lead to benefits such as faster innovation of new products, reduced duplication of efforts, savings in research and development costs, and enhanced employee satisfaction. Being able to share and build a richer set of knowledge is one of the major advantages of global alliances. Electronic technology facilitates these alliances, but the physical interaction between people is what eventually brings the knowledge to fruition.

Knowledge Sharing

In addition to creating new pools of knowledge, global e-business alliances also enable sharing of knowledge. On the social front this is amply evident in fighting crime as well as fighting the modern-day scourge of terrorism. This is because in this age of communication, it is sharing of knowledge that takes even higher precedence than the existence and capitalization of such knowledge. In terms of e-business alliances, sharing of knowledge in the domains of processes, designs, engineering models, customer data, analytical techniques, and so on form substantial reasons for creation of such alliances.

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Market Expansion

Market expansion has been considered one of the basic reasons for formation of business alliances. Business alliances between two or more organizations enable the partnering organizations to have access to each other's customers, suppliers, and the general markets where the organizations have been conducting business activities. It is understandable, then, that formation of a business alliance requires creation of local know-how amongst all participating businesses. It is equally understandable that for some partnering businesses that are coming for a different "geo-political" climate, the social and cultural aspect of the local know-how may itself be too idiosyncratic to be relevant outside the particular local market. For example, a computer chip manufacturer in Japan wanting to sell its products through alliance partners in Australia would want to understand the cultural and social nuances of the Australia-New Zealand region before embarking on the market expansion journey. Another common example is of a bank in Hong Kong wanting to expand its markets in the U.S.A. It will have to adopt to the socio-cultural value systems of the American market, which may be dramatically different from, say, the Gulf market, in terms of lending policies and value systems. Despite the challenges of differing cultures, however, businesses eventually find that through formation of alliances they are able to sell in a market that they had no access to earlier. Thus while alliances enable businesses to sell in a foreign market, they also make it almost obligatory to understand and leverage the cultural nuances of those markets. Leveraging different cultures is not just a business advantage, it is also a business imperative (Teitler, 1999). Companies that develop best practices for managing culture capital find they are able to expand and supplement their e-business with physical growth. Without such best practices, however, they face the situation similar to the case study discussed by Unhelkar (2003c), wherein an Indian chemical manufacturing company rushes into its expansion in Australia and finds the going tough precisely due to lack of consideration to these socio-cultural factors.

Customer Service Enhancement

While a sale across borders may happen easily using electronic commerce, it is not always easy to service the same customer across boundaries. In many post-sale scenarios, as commonly experienced by customers buying cars and groceries, even local customer care is often uneven at best, let alone customer care across global markets. Global markets increase the risk of customer dissatisfaction or even customer churn. "Customer service is often seen as a necessary evil," says Raul Katz, a vice president with Booz-Allen & Hamilton. Good managers realize that in their business, customer service is one vital element in

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holding onto premium customers in the face of competition. An example of enhanced customer service through alliances is IBM, which set up alliances with 61 software companies in 2001, up from its 50 alliances in 2000. The expectation of IBM, through these global alliances, was that it will add up to $2 billion in new revenues in 2001. Mike Gilpin, vice president and research leader of Giga Information Group, says about this increasing number of partnerships that it "allows IBM to solve a wider percentage of their customers' problems." Bryce (2001) adds: "They can grow Global Services, do more outsourcing deals and provide more strategic assistance to clients." This is because IBM's alliance partners are available to provide service for products that may have been sold across boundaries, in another country or region where IBM itself may not have had a physical presence. Thus while e-business provides a single unified face to the customer because of global alliances, personalised and even peculiar needs of customers can be satisfied by the local know-how, expertise, and physical presence of alliance partners. This not only results in a wider customer base but also higher-volume growth from the same customers.

Risk Apportionment

Global e-business alliances are extremely helpful in spreading the risks to businesses arising, amongst other things, primarily from political instabilities. Global alliances provide excellent opportunities for strategic management of risks in businesses when they are operating out of unsure political climates. This, of course, requires that the issue of response to changing political circumstances in different cultures is properly considered and integrated in the global response strategies of the business alliances that operate in global markets. In order for the management of a company to keep track of all the changing technological, economic, political-legal, and socio-cultural trends around the world, it is essential that they shift from a vertically organised, top-down type of organization to a more horizontally managed, interactive organization (Nuese, Cornell, & Park, 1998). Horizontal structures are flexible, enable ordinary employees to play crucial roles by interacting amongst themselves, and enable spreading of risks due to vacillating external (in this context political) factors. Alliances with local players have a distinct advantage over traditional multinational company structures in this respect. For example, to gain access to China while ensuring a positive relationship with the often-restrictive Chinese government, Maytag Corporation formed a joint venture with the Chinese appliance maker RSD (Adler, 2001).

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Outsourcing

Although criticised in the current (year 2004) politically charged climates of Australia and the U.S.A., outsourcing plays a significant cause for business alliances, enabling alliance partners to capitalize on the unevenly distributed pools of skills and resources across the globe. By making it feasible for organizations to outsource certain routine work, typically to another country, there is potential for significant savings as well as the ability to provide service around the clock (due to time differences around the world). This is invaluable, for example, in providing 24x7 call centres, which are themselves made possible through the electronic and communication medium. However outsourcing usually comes with its own limitations in terms of social communication problems, understanding what is meant within the contractual terms, and understanding the requirements and agreement on what constitutes a quality deliverable. Furthermore when strategic work is outsourced (as compared with routine work), it brings even greater challenges of the need to understand the direct and implied meanings behind all types of communications. These are the situations where excellence in business processes, use of industry-standard modeling tools and techniques by partnering organizations, and improving the overall communications between outsourcing partners can play a crucial role in the success of such alliances. (For greater details on application of software processes in success of outsourcing projects, see Unhelkar, 2003d.)

Legal and Tax Advantages

Global alliances facilitate companies to research, produce, and sell legally by taking advantage of the local rules and regulations of the governments of the environments where they operate. For example, stem cell research may be considered unacceptable, unethical, or even illegal in some regions, but may well be acceptable in others. Alliances, especially at the global level, are able to take advantage of the regulations spread across the globe, in order to achieve their goals. Alliances in the educational sector are common, and there are popular examples of legal and tax advantages being used effectively in running global educational institutions.

The Cultural Context

Having thus discussed the creative causes or reasons why businesses enter global e-business alliances, we now create an understanding of the cultural

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context under which these global e-business alliances can be studied. Studying the cultural context provides robust theoretical background to this chapter. Indeed Hofstede (1980) has given tremendous importance to culture as an environmental factor influencing all types of business alliances.

Defining Culture

In order to understand the influence of culture on electronic business alliances and the possible hurdles cultural issues may pose to businesses in terms of their socio-cultural disparities, it would be appropriate to base the discussion on defining and studying "culture," understanding the differences in cultures, and learning how to overcome these differences in a creative and positive way. To achieve this purpose, let us first consider the word "culture" itself. What do we mean when we talk about culture? At an informal level it appears to be the ethos exuded by a group of people. Practically it is the way members of an entire society live their lives — the way they eat, dress, live, and even die.

On a more formal level, according to an anthropological definition (Devereaus & Johansen, 1994), culture is an integrated system of learned behavior patterns that is characteristic of the members of a society. Culture refers to the total way of life — the underlying patterns of thinking, feeling, and acting — of particular groups of people. It is learned, not inherited, and transmitted from generation to generation primarily through conditioned learning. Another definition, by Hall and Hall (1989, p. 179) is: "Culture is 'a system for creating, sending, storing and processing information.'" These definitions themselves seem to indicate that whenever different cultures try to intersect, there are bound to be differences. Therefore it does not come as a surprise that global alliances face cultural disparities as one of their major challenges.

High-Context versus Low-Context Cultures

Devereaus and Johansen (1994) further provide an excellent analysis of the chasms that exist between different types of cultures. According to them, in general, cultures can be classified as "high context" versus "low context" cultures. These groupings may also be considered by us as "Eastern" versus "Western" cultures, respectively, although Eastern-most countries like Australia or New Zealand may be considered "Western" with respect to this discussion. The high-context Eastern or oriental cultures are based on the value system of "who you are" rather than the low-context cultural values of "what you do." This fundamental difference in the value systems tends to drive these cultures. These major differences between the Western and the oriental value systems still persist and provide the basis of most cultural differences between organizations

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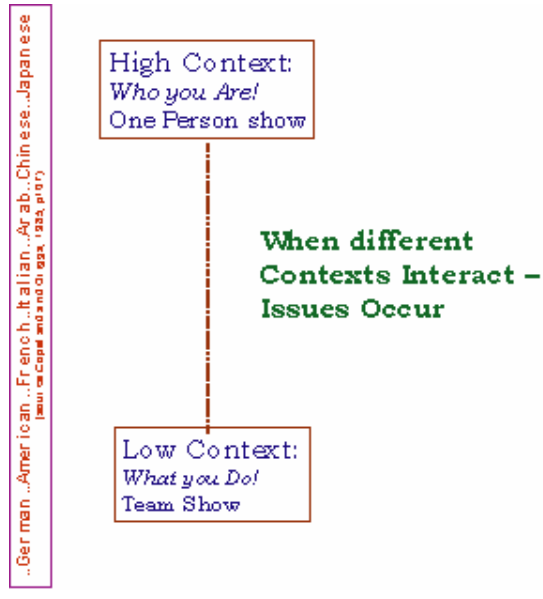
Figure 1. High-context versus low-context cultural value systems (based on Devereaus & Johansen, 1994)



forming alliances. And when global alliances are formed between these culturally different organizations in a hurry, these organizations tend to drift apart with time, based on these fundamental differences. This is not to say that there aren't other differences such as religious, wealth, political, and related allegiances. However the "context-based" differentiation is most prominent when global alliances are formed.

Categories of Global Alliance Issues

Let us extend our understanding of the fundamental differences in the cultural systems to global alliances. The entire range of global alliance issues can be classified into three major categories: creation, operation, and exiting (folding of the alliance). These categories of issues have their own nuances, and each of them is capable of being influenced by technical and social aspects of the alliances in varying intensity. The categories of alliance issues and the technical and social influence on those categories is shown in Figure 2.

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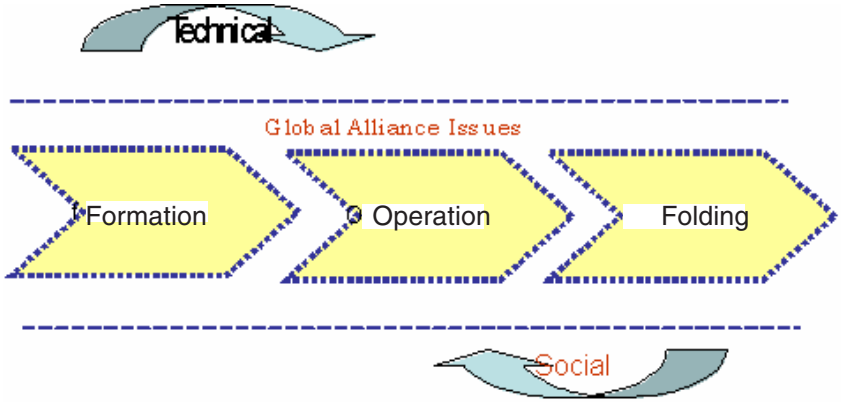
Figure 2. Technology and sociology influences in the formation, operation, and folding of global alliances



Formation

The formation stage of the alliance is the initial setting up of the alliance that is primarily based on technology. In fact, as discussed at the beginning of this chapter, technology (notably communications technology) is the true and creative cause of global alliances. While the business world always had global alliances in the past, it is these modern-day alliances that are trying to use as much technology as they can to communicate and process information. However, as argued by Hammer and Champy (1994) during their "Business Process Re-engineering" revolution, information (and now communications) technology is not merely providing the tools to automate and run global businesses, it is actually a cause for those businesses.

More specifically, the technologies that come into play during the formation stages of a global business alliance are the ones that facilitate communication between software applications belonging to the participating organizations. Thus the middleware technologies of distributed computing object model (DCOM) and common object request broker architecture (CORBA) can come into play at this stage. However these technologies have been good with globalizing organizations so long as their interactions were within the organization itself. This can be called intra-organizational collaboration facilitated through DCOM and CORBA. When it comes to inter-organizational collaborations, the technology that facilitates the communications is that of Web services. When organizations with different cultural backgrounds (note the earlier discussion on high-context versus low-context cultures) undergo alliance "formation," they may need all of these communication technologies, resulting in a composite model of technology, as discussed by Chaturvedi and Unhelkar (2003).

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Operation

Once the alliances have been formed and businesses start operating under the terms of mutual agreement as well as under the constraints and facilities provided by the technologies, then the socio-cultural issues start taking more prominence than in the formation stage. During operation of an alliance, there are a range of non-technical issues that start creating major influence as well as stress on the global alliances. These non-technical factors span the primary socio-cultural issues as well as political and legal issues. In fact non-technical issues tend to be confusing and chaotic even in their influence on the global business alliances; this is primarily because they are difficult to identify and isolate in the formation stage of the alliance, and by the time the alliance reaches the operation stage, it is usually too late to fix these issues properly. Furthermore there are a number of these non-technical issues that feed into each other as the global alliance evolves. For example, the political climate of a region is bound to influence the legal aspect of the alliance, and that, in turn, the social climate amongst the members of the alliance. In addition to this chaotic influence of non-technical factors on the alliance, the physical time and distance take their toll on the way the alliance operates, resulting in an impact on the financial viability of the alliance as well as the compatibility of the member organizations of the alliance. As this chapter gets written, there exists a certain lacunae in the global electronic alliance literature in terms of robust financial models for such alliances. The lessons from the dot-com era suggest that lack of well-researched financial models lead to weaknesses in globalization attempts and have a great potential in bringing the downfall of globally aligned businesses. Finally, during this operation stage of the alliances, individual skills as well as their adaptability to different cultures plays a significant role in the success or failure of these alliances.

Exiting

Just as formation and operation of a global alliance requires consideration of socio-cultural factors, similarly exiting out of a global alliance also requires detailed consideration to numerous "social" or non-technical factors as follows:

- Internal to the business itself including its employees, its operations and finances
- Influence on the business partners of the alliance
- External to the customer and suppliers who may not be part of the alliance

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- External to the environment in which the alliance existed, including governmental factors

The act of exiting out of a global alliance may itself be forced due to social (non-technical) factors, although technical incapability or incompetence can also be one of the reasons for closure of a business alliance. It should be noted that an exit out of an alliance need not be necessarily negative in nature. For example, if an alliance partner has diversified in various other areas of products and services that are not congruent with the alliance goals, but which are rewarding to the individual business, then that business may decide to exit out of the alliance. At other times exits may be forced due to legal and governmental factors. However, in all such cases, it is imperative to ensure that the exit is not sudden, unplanned, and deleterious to the alliance members. The only way to achieve a successful exit is to ensure that such possibilities are planned for and incorporated in the agreements that are reached during the formation stage itself. Not only does this help if the exiting is required but, in fact, it may also help obviate an unnecessary exit. This may happen because all members of the alliance are fully aware, right from the outset, the effects the exits will have on them. Therefore a member of the alliance cannot "surprise" its member partners or cannot "hold them to ransom" by threatening an exit whose effects may be unknown. Graceful exit from an electronic alliance is facilitated only when its possibility is incorporated in the formation stage of the alliance.

Cultural Issues: Influence and Mitigation in Electronic Alliances

Growing Cultural Significance

Standalone computing, even today, does not require interaction amongst individuals. It is self-sufficient and primarily focuses on automation of tasks. However as computing machines are networked, enabling interaction amongst team members, social issues related to computing start emerging. A team is an organized entity that is managed by rules; hence networked computing maintains a "controlled" sociological perspective. However once an entire enterprise is networked, and especially in the global context, the challenge in terms of sociological aspects of computing escalates, bringing the traits of teams and individuals within the teams to the fore. Finally, when an entire industry is networked, perhaps through technologies such as Web services, leaving a single business thread running through the entire industry (also known as Advait

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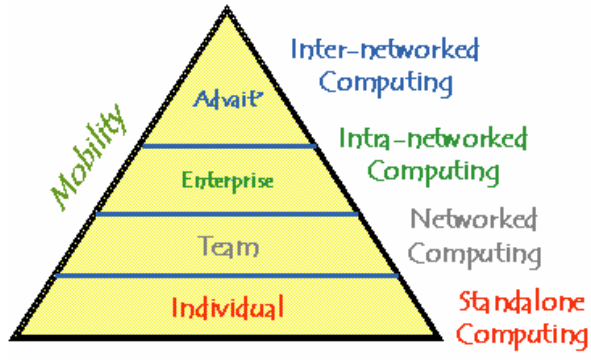
Figure 3. Increasing impact of computing on individuals, teams, organizations and clusters (large industrial clusters also known as Advait)



Enterprise) the socio-cultural impact is immense. Numerous physical and technical alliances are likely to take place when a group of organizations reach the "Advait" level of inter-networked computing.

When such a stage of inter-networked computing is reached, the dependence of businesses on each other through formation of alliances across geographical and cultural borders is massive. It is crucial that such alliances start off by ensuring that they do not imply an imposition of one organizational culture over another. Rather it should create a new culture that brings together the best elements of each one (Brooks, 1998). This is what is known as "synergy" and is something we sorely need in order to successfully handle the cultural differences in global alliances. However synergy is usually lacking in global alliances because these alliances are often viewed solely from a financial perspective, leaving the human resource issue as something to be dealt with later and hopefully without a great deal of effort. And whenever change is imminent as a result of alliances, it is usually assumed that the smaller, weaker company is the one that has the obligation to change. Errors like these are commonplace, resulting in failure to achieve even the basic aim of financial success. While creation of synergy between global partners with different contextual background is expensive and time consuming, it is still vital that this issue is addressed right from the beginning of an alliance. The end result is far more valuable in terms of not only financial rewards but also employee satisfaction, broadening of cultural viewpoints, and a deeper and perhaps longer-time sustainable alliance. We now consider some of the major reasons for cultural disparities in global alliances and what can be done to ameliorate them.

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Communications Gap

While electronic communication has never been easier, a very basic cultural hurdle can occur in social communication. Communication between a parent company and its foreign subsidiaries can be hampered by diverse language, culture heritage, and physical distance (Segil, 1999). A growing and popular example is that of a service alliance being set up between an Australian company and Chinese company. Although few Australians would be able to converse in a Chinese language, there are increasing numbers of Chinese who are able to converse in English comfortably. This leaves English as the default language for business alliances between Chinese and Australian businesses. While this situation is certainly going to facilitate the communications between the alliance partners, it is essential that the "foreign-ness" of English language used by the Chinese counterparts should be considered extremely sensitively by the Australian members of this alliance. It is obvious that there are some major differences in the nuances of expressions from these two different cultures. The Australian culture is predominantly "low context," wherein what "you do" is important. This requires people from these cultures to express themselves well, and, occasionally as hard, as they can. The Chinese culture is context-based and depends on the pedigree of the person, to a certain extent. Therefore a person with Chinese cultural background, despite conversing in English, is bound to show the restraint expected of him or her in similar conversations within the Chinese context. It is recommended that special efforts be made before and after formal meetings to search for thoughts that might otherwise not have been expressed, and meanings should be clarified by spelling them out rather than taking them for granted. As this chapter gets written, this author is personally experiencing the situation described here as he delivers a course in object-oriented software engineering to a group of students belonging to Nanjing University of Chinese Medicine (NUCM), in Nanjing China. Despite the ease of electronic alliance and communication, ensuring that a "quality service" is delivered to the "clients'" numerous perceptions and adjustments are required. Furthermore written communications between alliance partners must receive special attention; it is easy to unintentionally offend by virtue of subtle language inflections that are misunderstood. E-mails are most notorious in this regard, and more so when they come from a different cultural background. Thus the key point in handling the communications gap is to ensure nothing is assumed and that every small bit of information is spelled out in detail. This effort will be well spent in ensuring that the intended meaning is actually conveyed and that the communication gap is bridged as much as possible and as early as possible during the formation stages of the alliance itself.

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Individual: Corporate Goal Alignment

Individuals work to their own personal goals. Organizations have their own goals. When these two are in sync, a synergy develops. When they are out of sync, or at times decidedly opposing each other, there is loss of energy and friction (Unhelkar, 1998). While this is true of a single organization, this alignment factor between individual and organization takes higher significance when global alliances are concerned. First, it is important for the alliance to have an entity that people (employees and customers) can identify with. This requires the alliance to create an image of a unified entity with its purpose and goals stated prominently and reiterated on numerous appropriate occasions. Since various members of the alliance may not be physically in touch with each other, creating, displaying, and understanding the goals of the alliance is a major exercise in itself. This misalignment of individual-corporate goals within the alliance members can destroy a global e-business alliance in its early stages, especially if it is coupled with the previously discussed factor of communications gap. Therefore it is vital that the business managers of such alliances ensure that there is a sustained effort put in in aligning individuals with corporate goals within all alliance partners.

Corporate Mistrust

Since the primary purpose of alliances is to make money, it does not come as a surprise that alliance partners tend to eye each other skeptically in the beginning. Given the communication gaps that exist between people in similar cultures, let along varied ones, this scepticism can quickly build up to paranoid proportions, resulting in a break of alliance. Thus corporate mistrust is a serious problem that, unfortunately, is further exacerbated by managers from both countries who have achieved their success by nurturing a tough, critical business image. Of course it is important that each party to an alliance protect its own assets, intellectual property, reputation, customer base, and so forth. But it is equally important to appreciate that only a mutual win-win relationship can succeed and endure. Hence each party should enter a relationship with a certain amount of trust in its partner and with an attitude that the partner's success is just as important as its own (Brooks, 1998). Cross-checking references and getting third-party recommendations on business alliances, as well as checking each other's corporate history, are some good ways of reducing corporate mistrusts.

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Social Incompatibility

Socio-cultural incompatibility results when two companies with different social environments, as well as disparate financial backing, try to get together into a cross-border alliance. While "going global" seems to be a strategic move, social incompatibilities existing between different countries and their cultures can cause problems in the functioning of these global entities. For example, the American socio-cultural context can be quite different from the German work culture and ethos. An alliance casually put together to capitalize on the German engineering skills and American markets can degenerate into an ugly fracas if the differences in social and cultural contexts are not spelled out and studied prior to the alliance formation. While the American focus may be on the financial aspect of the alliance, it is possible that the German focus is on building a strong foundation for the alliance or perhaps creating a knowledge base.

In yet another not-uncommon example, an alliance almost collapsed because the two organizations had disparate staff policies due to different social background of the participating organizations. One organization gave half-day Fridays in the summer; the other didn't. One gave staff a day off on election day; the other didn't. At first there was grumbling, but both organizations came together frequently, giving everyone a chance to air their feelings. These meetings let people come to terms with their differences and remain productive.

Failure to address differences and disparate values or operations can quickly lead to the demise of an otherwise strong strategic alliance. The key to beating the odds is to assess and monitor partner compatibility up front and at every step of the way, constantly highlighting differences and creating solutions (Gupta, 2000). Studying social incompatibilities indicate that people with multicultural background and upbringing have a much broader view of the world (Unhelkar, 2002) and therefore also of the business world. These are the people better equipped to handle the inevitable social incompatibilities resulting from business alliances as they are able to adopt and adapt to differing social environments relatively easily.

Dissimilar Management Styles

Dissimilar management styles can cause culture conflict, too. One leader may be forward thinking while the other is of the old school of management thinking, relying on hierarchical management style. Constantine (1995) provides interesting discussion on these differing management styles and their impact on software projects — a scenario most certainly applicable in a global alliance undertaken for an outsourced software project. A common result of these differing

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management styles is also often seen in Scott Adam's cartoon character Dilbert. For example, Dilbert is often shown as a staff member who is left with no working space at all. However if one organization has a flattened hierarchy and an open seating plan and another one doesn't, and if people and managers from these organizations have to work together, they are bound to have different perceptions of the entire alliance exercise. If handled properly, exposure to different approaches to management can be liberating and enlightening. The important thing is to be sure staff members have a chance to discuss their feelings and work through solutions together.

Conclusion

The modern electronic business world is highly competitive and fast. To be able to survive and prosper in such a business world, there is need for organizations to expand their vision and their reach way beyond their traditional or home turf. While forming electronic alliances between organizations is not that difficult, forming corresponding physical strategic alliances is equally important, if not more, to service the electronic alliance. However each physical alliance, especially across geo-political boundary, is fraught with socio-cultural issues that influence such alliances. This chapter highlighted and discussed the need for such physical alliances, the cross-cultural issues that arise in such alliances, and what can be done to understand and improve the socio-cultural chasms that exist between disparate cultures of the participating organizations. Transcending cultural boundaries requires not only awareness and understanding but also the ability to adapt to, and leverage, the different cultures. The end result is an e-business alliance that is well supported in its endeavour to globalize an organization through corresponding physical alliances between two or many organizations.

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Chapter VI

Using DSS for Global Competitiveness:

An Effective Information-Based Decision Making Process in Public Administration

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Abstract

With a changing global environment driven by the innovative evolutions of information and communication technology, organizations are setting their priorities to cater to a global marketplace. In that respect, they are focusing on adding value propositions to different data and information elements gathered to help know more about customers and various environments where products and services are manufactured and traded. Therefore organizations continuously need to increase their business intelligence by monitoring systems that analyze information and develop indicators coupled with support mechanisms to decision makers to handle semi-structured and un-structured problems characterized by varying alternatives and parameters to understand the problem spectrum and help develop alternative solutions. This chapter discusses concepts and characteristics of decision

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support methods and demonstrates the gap between the decision maker and the decision support systems techniques demonstrating the experience of the government of Egypt in building its information infrastructure to help develop the decision-making process both at the government level and the local public administration level.

Background

Organizations continuously need to increase their business intelligence by monitoring systems that analyze information and developing indicators that are coupled with support mechanisms to decision makers to handle various types of decision problems characterized by varying alternatives and parameters to understand the problem spectrum and help develop alternative solutions. The objective is always to remain competitive and adapt to local and global organizational and market changes. Decision support systems (DSS), commercially called business intelligence (BI) solutions, represent powerful tools capable of enhancing the capabilities of managers in facing challenges, especially at times of continuous change. It helps improving decisions by providing accurate and relevant information and also supports in saving time. It also helps build a knowledge repository that can help understand the marketplace and compete more effectively. Business intelligence, which has a broader concept than data warehousing, is an essential component of the overall strategy of different organizations in a world much affected by globalization and where culture, change, competition, and technology represent influential forces in driving the decision-making process. It is important to note that data warehousing increases the decision-maker capabilities in a passive way due to its dependences on historical data; however, business intelligence helps in projecting the future to be able to set the appropriate tactical and strategic plans in a more active way and hence realize organizational objectives. Business intelligence definitely brings competitive advantages to the organization in the time of globalization. Its importance is in the forward and future projection of the needs of the organization. Strategies of the future nowadays represent the platform to decide the actions of today, and business intelligence helps to do that. Therefore the more it is used in strategy development, the more likely it can survive, grow, and compete.

Little (1970) defines decision support systems as a model-based set of procedures for processing data and judgments to assist a manager in his decision-making processes. He argues that to be successful, such a system must be simple, robust, easy to control, adaptive, complete on important issues, and easy to communicate with. Early definitions of DSS identified it as a system intended

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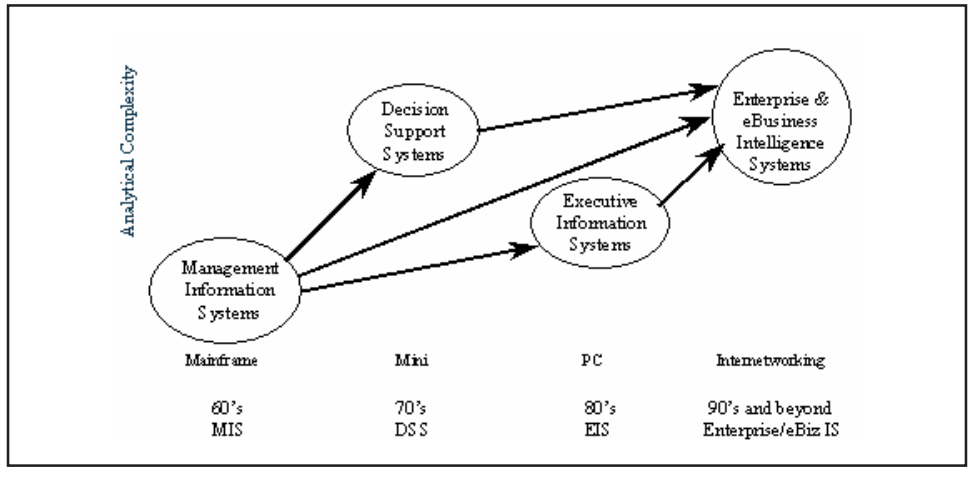
to support managerial decision makers in semi-structured and un-structured decision situations acting as tools to decision makers to extend their capabilities but not to replace their judgment. The human interface in the decision support formula is invaluable and an integral complementing element to the computer-based outcome. DSS are computer-based applications that operate interactively online and preferably would have graphical output capabilities. As for business intelligence tools, which are DSS for the business context, they were introduced to overcome the problems raised from disintegrated information clusters coming from different sources. Business intelligence tools add value to corporate information through sophisticated analytical processing and rapid delivery and presentation of accurate information to executives, managers, analysts, and other knowledge workers. Its data sources vary both internally (data-warehouse, data mart, transaction processing applications, and expert staff opinions and recommendations) and externally (market research and survey data). The developments and the historical path are demonstrated in Figure 1. It is important to note that while business intelligence is more deployed in business organizations, decision support systems are more available in government organizations and public administration.

Decision Support Systems

Organizations are increasingly in search of effective vehicles that can help them increase their benefits of stored data within the organization and transform such

Figure 1. Development of management support systems



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data into information and knowledge. There is always a need to explore the marketplace, the competition, and the economic environment among other constituencies in the community and to possess the mechanism and the internal business intelligence that can transform the knowledge of the society into inputs that can help formulate the organization's strategy. Such knowledge affects the business and organizational decision-making process at all levels. It also contributes to the organizational knowledge that is compiled from both internal and external sources. From day-to-day business tasks to the major strategic issues such as taxation policy and long-term business planning, information is required that is timely, accurate, and effective for the overall business decision process. In that respect decision support systems help decision makers generate alternatives and choose among the optimal course of action that can help attain the business goals (Kamel, 1998). The role of information experts and human interface will remain invaluable to assess the variable in the marketplace that can affect the performance of the organization.

DSS applications are designed, delivered, and institutionalized in different sectors and industries such as the health sector, tourism, petroleum, banking, and agriculture, among others. The usefulness of such applications varies in solving problems. They are not all equal in solving problems or in supporting decision-making processes where some of them are more intelligent than others in terms of quality and response time, which brings the concept of intelligent density, which is a scale for these systems to solve problems or to support decisions. The intelligent density concept; therefore, provides the decision maker with a ranking mechanism so whenever he/she has a problem or needs a support, then there is a need to select a tool based on the most intelligent capacities available. Such capacities also change and adapt from time to time according to the case in hand; that is, it could be viewed as a one-time system with many variables to be adjusted and adapted.

Some other definitions include Simon (1977), who mentions that managerial decision making is synonymous with the whole process of management; Little (1970), who claims that it is a model-based set of procedures for processing data and judgments to assist a manager in his decision making; and Keen (1980), who claims that DSS apply to situations where a final system can be developed only through an adaptive process of learning and evolution (Turban & Aronson, 2001). The decision-making process is also bound to the changes in the marketplace, and that is why it usually goes through the design, development, implementation, and institutionalization phases with continuous adaptation. Unless such adaptation takes place, more problems occur because of dissatisfaction of the decision maker, who attempts to reach a process that can help him make the most optimal decision. The institutionalization process is a continuous process that allows for regular changes to fit the environment, whether internal or external. The problem identification process also includes and is complemented

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by the problem classification and decomposition. It is important to note that the nature of the problem could vary from totally structured to semi-structured to unstructured. This actually defines and forces the information system model to be used to handle the problem and the challenge faced by the decision maker. In the problem decomposition phase many problems and issues could be divided into sub problems. In that respect, there are three phases of the decision-making process.

Phase I – Intelligence Phase

This phase is concerned with gathering information from different sources and being aware of occasions when a decision is required, routinely collecting knowledge relevant to the business area, and classifying and storing it. The intelligence phase focuses on the identification of organizational goals and objectives related to an issue of concern, such as inventory management and determining whether they are being met. The intelligence phase relies on extensive quality information. Information about the market, competition, and potential new products, services, and elements affecting the decision making process are essential for survival and growth.

Phase II – Design Phase

This phase handles the full understanding of the problem and is concerned with designing, developing, and analyzing various solutions. The feasibility of possible solutions and a model of the problem is built and tested. This can be implemented by accessing information, generating business models, and using communication mechanisms to readily share and consolidate results and identify the best solution. Comparative analysis reports and mapping between different scenarios is essential. Moreover simulation models enable the decision maker to experiment, to try different scenarios to determine the most feasible solutions affecting different decisions and business processes.

Phase III – Choice Phase

This phase reflects the selection among the different alternatives. Numerous feedback and alternatives are being discussed, and it is up to the decision maker with his support aids to aim for the optimal solution. It is important to note that some problems have one clear solution agreeable to all involved, but it is often the case that a lot of allowable solutions exist, and the choice or selection are not quite easy. This phase, supported by modern presentation tools, help the entire team to choose the solution.

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Decision Support Systems Characteristics and Capabilities

It is important to mention that decision support systems characteristics and capabilities include: (a) providing support to several interdependent and/or sequential decisions, (b) supporting a variety of decision-making processes and styles, (c) adapting over time where the decision maker should be reactive, able to confront changing conditions quickly, and able to adapt the DSS to meet these changes, (d) supporting various managerial levels, ranging from top executives to line managers, and (e) supporting individuals as well as groups with less structured problems.

Decision Support System Application

Decision support systems application, mainly targeting senior executives and chief executive officers, could be composed of the following subsystems (a) data management subsystem, which includes a database that contains relevant data for the case analyzed and is managed by a software (database management system) that could be connected with the corporate data warehouse; (b) model management subsystems, which are a software package that includes financial, statistical, and other quantitative models that provide the system's analytical capabilities and appropriate software management as well as modeling language for building custom models; (c) knowledge-based subsystem that provides expertise in solving complex unstructured and semi-structured problems through the use of expert or other intelligent systems; (d) user interface including all communication between a user and the DSS software through graphical user interfaces; and (e) users who are different including managers, decision makers, knowledge workers, business analysts, and staff.

Decision Support Systems Classification

Pending the nature of information and knowledge required, decision support systems could be identified and classified as follows: (a) text-oriented DSS, (b) database-oriented DSS, and (c) model-oriented-DSS. With respect to text-oriented DSS, information (including data and knowledge) is often stored in a textual format and accessed by decision makers. A text-oriented DSS supports decision makers by electronically keeping track of textually represented information that could have a bearing on decisions. It allows documents to be

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electronically created, revised, and viewed as needed. Information and communication technology such as Web-based, document imaging, hypertext, and intelligent agents can be incorporated into text-oriented DSS applications. With respect to database-oriented DSS, the database organization plays a major role in the DSS structure. Early generations of database-oriented DSS mainly used the relational database configuration. The information handled by relational databases tended to be huge, descriptive, and rigidly structured. A database-oriented DSS features strong report generation and query capabilities. With respect to spreadsheet-oriented DSS, a spreadsheet represents a modeling language that allows the user to write models for analysis. Such models not only create, view, and modify descriptive knowledge but also instruct the system to execute its self-contained instructions and is effective support for end user-developed DSS such as Excel and Lotus.

Based on the theoretical overview, following is the experience of a developing nation, Egypt, in developing its national information infrastructure and the utilization of decision support systems in attempting to solve its socio-economic problems as well as render the business community more aware and sensible to the massive support, accurate, timely, and relevant information could introduce to the business sector and help it compete globally.

Building Egypt's Information Society

Egypt is home to more than 70 million people and growing at an estimated rate of 1.9% (*www.mcit.gov.eg*). Egypt is one of the largest economies in the Middle East. The nation's current economic growth rate stands at 3.1% annually with an inflation rate of 6% (*www.economic.idsc.gov.eg*). It is undergoing privatization and liberalization of a number of its major economic sectors. Although the population is settled on only 4% of its land, which extends to around 1 million square kilometers, infrastructure development and extension reaches all 26 different provinces. Infrastructure is growing in two directions, horizontally to provide the basic needs of the society and vertically to keep pace with the developments taking place worldwide in different sectors, including information and communication technology. Egypt has a large service sector mainly built around tourism and transportation. Its major exports are human resource capacities, petroleum products, cotton, and leather products; its major imports are food, machinery, and vehicles. Agriculture accounts for nearly 16% of the gross domestic product, industry 35%, and services 49% (*www.mcit.egov.eg*). Information technology has been identified by the government of Egypt since the mid 1980s as a potential player and a platform for growth.

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In 2001, the information technology market was valued at 849 million U.S. dollars with an annual growth rate of 16.3% and by 2004, the value of the market is expected to reach 1.315 billion U.S. dollars with a compounded average growth rate (CAGR) of 16.1% from 1998 (American Chamber of Commerce in Egypt, 2002). It is important to note that although information technology came to Egypt in the early 1960s, it was only in September 1999 that it was featured extensively on the agenda when the government of Egypt took a major step toward the deployment of information and communication technology for socio-economic development following the earlier steps and projects that had started since the mid 1980s. In that respect, the ministry of communications and information technology were established. Moreover a three-year national ICT plan was formulated that addressed the following issues: upgrading the current telecommunications infrastructure to build an effective and accountable infrastructure that can provide Egypt and the Middle East and North Africa region with reliable, effective, and affordable telecommunications services; creating a legislative environment conducive to encouraging local and foreign investors to operate in the ICT field; creating local demand for the ICT industry to motivate local and foreign investors; targeting international markets by creating an ICT industry capable of competing globally and transforming the sector into an export-led industry in order to capture a greater share of the global market; developing qualified human resources to develop and employ cutting-edge information and communication technologies; and attracting foreign investment through global alliances (*www.mcit.gov.eg*). The plans developed and the resources allocated were capitalizing on an earlier effort that was put together since 1985 and had resulted in the establishment of the Cabinet Information and Decision Support Center (IDSC), which introduced to both the public and private sector for the first time the concepts of using computer-based decision support systems for business and socio-economic purposes.

Decision Support Systems in Egypt

Decision support systems, since their inception in the 1970s, have been differently defined and conceptualized by vendors, researchers, and academic commentators. However there has been general agreement that decision support systems are computer-based systems that help decision-makers confront ill-structured problems through direct interaction with data and analytical models. Some of the classic DSS texts show that the focus of research and application of decision support systems has to a large extent been on individual managers and on organizational decision processes, largely for the private sector. Thus DSS are mainly represented as providing a set of opportunities directed toward improving the effectiveness and productivity of managers and professionals,

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boosting the organization's competitive edge, and rationalizing the decision making process within an organizational context. They aim at realizing the desire for accurate, timely, and relevant information to help individual managers in organizations deal with an increasingly turbulent economic environment and the growing pressures of competition. Much less emphasis has been given to the application of DSS in three particular areas: (a) their use with groups (although group decision support systems nevertheless represent a significant domain of research and application); (b) their use in the public sector; and (c) their use to support socioeconomic development.

In many ways, Egypt is a typical developing country. It faces the common problems of developing countries such as heavy foreign debt, a balance of payments deficit, a high illiteracy rate, poor technological infrastructure, lack of financial resources, and high unemployment. It has been striving to implement a nation-wide strategy to support the realization of its targeted socioeconomic development program to deal with these problems. Over the last decade Egypt has managed to restructure many of its sectors and has improved the position of its economy and is striving to complete the economic reform program, although sometimes being hindered by internal economic deterrents as well as by external effects that affect the growth of the economy at large.

In the mid 1980s, the government of Egypt adopted a far-reaching supply-push strategy for the introduction, implementation, and institutionalization of large information and decision support systems intended to improve strategic decision making at the Cabinet level with respect to socioeconomic development. The strategy had to be tailor-made to the decision-making needs of the Cabinet of Egypt, which addresses a variety of socio-economic development issues. These issues include public sector reform, administrative reform, debt management, and privatization. The nature of these issues makes them adaptive to the environment and liable to continuous changes taking place locally, regionally, and globally. Before decision support systems were implemented, the following characteristics were identified within Cabinet decision making: (a) it was data rich but information poor; (b) information systems and management specialists were isolated from the decision makers; and (c) computer systems were not viewed as tools that could support decision making. Moreover, the focus of improvements was more on technical issues rather than on decision outcomes. Despite these undoubted obstacles a project was initiated to support Cabinet-level decision making through state-of-the-art information technology tools and techniques (Kamel, 1996, 1998). In 1985, the Cabinet of Egypt established the Information and Decision Support Center (IDSC), whose mission is to provide information and decision support services to the Cabinet for socioeconomic development. The objectives of IDSC included: (a) developing information and decision support systems for the Cabinet and top policy makers in Egypt; (b) supporting the establishment of decision support systems/centers in different

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ministries and making more efficient and effective use of available information resources; (c) initiating, encouraging, and supporting informatics projects that could accelerate managerial and technological development of Egyptian ministries, sectors, and governorates; and (d) participating in international cooperation activities in the areas of information and decision support.

The Cabinet's IDSC activities accommodate four different domains: (a) The Cabinet for which IDSC provides information, decision support, crisis management support, modeling, and analysis of various high priority issues and multisectors information and database developments; (b) the economic sectors for which IDSC provides assistance in the development of decision support systems/centers, advice, and consultancy in the area of information and decision support services, sectors' database development, and project financing and support; (3) the economy for which IDSC provides assistance in policy formulation and drafting, as well as support for legislative reform and human and technical infrastructure development; and (4) the national information and technological infrastructure for which IDSC provides opportunities and facilities for technology transfer to Egypt as well as to other developing countries through the establishment of generic DSS models for socioeconomic development. Following are four different decision support cases that were managed and analyzed by the Cabinet of Egypt Information and Decision Support Center and set the pace for other cases that deployed advanced information systems in developing scenarios for socio-economic challenges.

Decision Support Cases

a. DSS for Strategic Issues: DSS-Based Debt Management System

During the 1990s, economic rebuilding efforts required Egypt to accumulate a foreign debt of about 33 billion U.S. dollars covered in 5,000 loans. These loans needed to be monitored for debt service payments, term re-negotiations, interest rate levels, and payment management and scheduling. The magnitude of the debt burden led the reform of the debt management program to become a priority issue at Cabinet level. Hence IDSC initiated, developed, and implemented a debt management system aimed at the rationalization of debt utilization and at debt reduction and rescheduling. The system was developed to provide a management tool to support and facilitate the registration, monitoring, control, and analysis of Egypt's debts.

Over a period of 18 months a national comprehensive database, located in the Central Bank of Egypt, was developed by IDSC's technical staff. The database included details of government debts and payments, linked to a debt payments

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transaction processing system. The database was provided with decision support system capabilities, enabling the implications of different debt management scenarios to be tested. Throughout the development phase a number of technical and cultural problems came up that caused delays and frustration, including hardware requirements, software availability, and processing of operations. Cultural issues included the fact that most of the software was developed and interfaced in English, which represented a problem for many Egyptian users. The impacts of the system, using decision support tools and generators, was the successful negotiation of debt rescheduling with 14 countries. Negotiation was smoothly managed through the provision of grounded information support that was made available via the DSS. Moreover loans have been viewed ever since as part of a comprehensive, integrated, and dynamic portfolio rather than being managed on an isolated case-by-case basis.

b. DSS for Strategic Issues: Customs Reform Program DSS

Through one of its reform programs the Cabinet of Egypt was about to impose a new set of customs tariffs, largely for imported goods, which were intended to reduce the burden on low-income groups, increase the revenue of the government, and create a homogeneous and consistent tariff structure. Anticipation of the tariff changes caused stagnation in the business sector for four months. As a result, multi-sectors conflicts arose between six different ministries. Hence some form of decision support system was needed to resolve the conflict and to support imposition of the new tariffs.

Therefore a team consisting of Ministry of Finance and IDSC personnel was formed to interact with the different parties, get feedback, and generate different scenarios to be assessed. A computerized DSS was developed, as a result of which the various inter-ministerial conflicts were resolved within a four-week period. Moreover a tariff structure was formulated, based on the various scenarios and alternatives that were generated by the decision-support system. The government endorsed the new tariff model, which was also accepted by the business sector.

c. Sectoral DSS: Ministry of Electricity DSS

The increasing cost of government subsidy to electricity generation in Egypt were continuously enlarging the country's balance of payments deficit and adding to public sector debt. To help address this issue, IDSC developed a decision support system for the Ministry of Electricity that was intended to: (a) assess the impact of tariff changes on different income groups, (b) provide

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statistical data on power and energy generation, (c) provide statistical data on the distribution and consumption of electricity, and (d) assist decision making about the pricing and management of loans within the electricity sector.

A joint team was formed from IDSC and Ministry of Electricity staff. While the ministry staff collected data from different sources, IDSC staff focused on issue structuring, systems and human resource development, and, more importantly, on managing the process of developing and delivering the decision support system. During the implementation process, drought emerged in the sources of the river Nile, causing a dramatic drop in the hydroelectric power generated by the Aswan dam and necessitating the provision of 5 million U.S. dollars to fund the rapid construction of three power-generating stations. As a result, the Ministry of Water Resources was drawn into contributing to the project, since it became a stakeholder in the decision-support system design process. At this stage the project team therefore incorporated a third group from the Ministry of Water Resources to cover the issues relating to hydroelectric power. In part the recognition of the ministry as a key stakeholder in electricity generation and its inclusion in energy decision making was one of the main outcomes of the DSS design and implementation process. The DSS also led to decisions about a new electricity tariff after assessment of the possible alternatives generated by the decision support model and the evaluation of their impacts on different income groups. The case showed that design and implementation processes are inseparable and evolutionary throughout the entire information systems lifecycle.

d. Information Infrastructure Build-Up: Governorates' Decision Support Centers

Once IDSC realized the vital role of information in decision making and in socio-economic development, it adopted a supply-push strategy to improve administrative effectiveness at the provinces level through the use of information and decision support tools and techniques. The project aimed to rationalize the decision making process of the governors through the use of state-of-the-art information technology. The project adopted its supply-push strategy through the implementation of two parallel policies: the development of an infrastructure for informatics and decision support systems, and the development of human capabilities in the areas of information, computers, and communications. To fulfill this strategy, IDSC developed a comprehensive information base for the governorates through the establishment, in each governorate, of a governorate information and decision support center (GIDSC) to introduce and diffuse information technology and to re-envision the role of the governorates in development planning. The impact of GIDSCs was reflected in the number of information and decision support cases delivered and in the diffusion of informa-

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tion technology knowledge and use at the governorate level. Moreover the work of the GIDSCs led to the introduction and implementation of a new law for local administration — representing a direct result of the project — that allowed decentralization of decision making authority and power to the governors. It is important to note that the GIDSCs had a direct impact on the structure of decision making at the governorate level (Kamel, 1996).

Managing the Process from Design to Institutionalization

The experience of managing the development, design, and implementation of decision-support systems such as those described above can be generalized as a set of steps and procedures for future use of decision support systems in similar cases. IDSC adopted a two-phased approach for the implementation and institutionalization of its issue-based decision support systems projects (El Sherif & El Sawy, 1988). The first phase (implementation) was concerned with the realization of decision support systems and includes a particular focus on model building. The second phase (institutionalization) was concerned with embedding the DSS into their organizational contexts and includes a particular focus on management. The implementation phase was typically divided into three parts: (a) the identification of policy needs and the full mobilization of human and technical resources to achieve effective response and support, (b) the identification of decision areas and information requirements, thus translating the planned policy support into specific issues of concern for the recipient organization; and (c) the formulation of projects with specific goals and dedicated human and technical resources for each potential area of policy and/or decision support. DSS project teams were selected to provide fast response and a focus on results and action. They were two-tier teams comprising government bureaucrats and professional technocrats able to deal with bureaucracy and IT professionals competent to handle state-of-the-art information and decision support technologies. These two-tier teams were hybrids that represented one of the key success factors in bridging the application gap between systems builders and applications users (Kamel, 2001).

The institutionalization phase covered IDSC's experience with designing, developing and implementing decision support systems for development planning purposes. This experience suggested that managing institutionalization is as important as model building and that institutionalization is a complementary and integrated process that accompanies systems development, design, and implementation. It comprises six components as shown in Table 1.

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Table 1. Institutionalization phases

Phase	Actions Taken
Adaptation	▪ Various modifications needed to fit the contextual and cultural characteristics of the application environment, such as making use of available Arabized software and designing and developing tools and utilities to support and facilitate the use of Arabic-interface software.
Diffusion	▪ Spreading the use of decision-support systems and developing the information technology infrastructure across all organizational levels.
Adoption	▪ Personalized use of information technology tools and techniques by decision makers as well as their support staff.
Monitoring and Tracking	▪ Addressing critical issues, assumptions, priorities, and information and decision requirements, and tracking changes in technology and its potential input to the decision-making process.
Value Assessment	▪ Reviewing the contribution of decision support systems to public sector strategic decision making in Egypt in terms of tangible and intangible benefits such as: improved decision making at the Cabinet and governorate levels and more efficient use of available resources.
Evaluation	▪ Appraising, analyzing, and validating value-added benefits of decision support systems developed for socio-economic development planning.

The use of decision support systems in development planning led to the identification of a number of challenges related to strategic public sector decision making, decision-support systems, and the implementation and institutionalization of rational management approaches. It is important to identify and deal with these challenges effectively to be able to deploy such advanced information systems in a way to render the organization more competitive both locally and internationally within a global environment that is consistently and continuously changing. Table 2 demonstrates such challenges.

Lessons Learned

Based on the implementation of more than 500 projects targeted at the development and diffusion of decision-support systems in Egypt for development planning, the following set of lessons learned can be summarized and could be

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Table 2. Implementation challenges

Strategic Public Sector Decision Making	Decision Support Systems Development
▪ Efficient and effective use of scarce resources ▪ Factors determining implementation of socio-economic development planning ▪ Ill-structured nature of strategic decision making processes ▪ Turbulent and dynamic environment within which decisions have to be made ▪ Crisis management mode of operation for many strategic decisions in the public sector ▪ Strategic decision making is usually a group effort rather than an individual one ▪ Need for conflict resolution in strategic decision making, given the major issues and stakeholders involved ▪ Formulation, development, and implementation of policy reform programs	▪ Managing the development of multiple information and decision support systems ▪ Institutionalization of such systems within their application contexts ▪ Development of usable decision-support systems interfaces ▪ Availability of decision support systems tools and generators relevant to different sectors and applications
Practical Implementation and Institutionalization of DSS	
▪ Resistance to change ▪ Lack of timely, adequate information about user needs ▪ Lack of user involvement ▪ User language problems ▪ Lack of top management support ▪ Lack of continuous communication from users ▪ Difficulty of problem definition ▪ Difficulty of responding to user needs ▪ Inadequacy of model evaluation ▪ Poor documentation	

used as possible models for similar implementations in similar settings in developing nations and in public administration environments. The lessons are:

- Structuring of socioeconomic decision-related issues is an integral part of the design and implementation of decision support systems dealing with national development planning.
- Providing decision support systems requires much time and effort in building and integrating databases from multiple data sources and sectors.

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- Developing a decision-support system to address one socio-economic issue might affect other issues that should be put into consideration during the design phase to save time and effort and avoid duplication of activities.
- Providing decision-support systems for development planning is often urgent and critical; hence the design should allow for a crisis management mode of operation.
- Providing crisis management teams with managerial and technical support capabilities is essential.
- Depending on timely, effective and accurate information is essential for effective decision-support systems.
- Implementing successful decision-support systems are necessary but not a sufficient condition for successful institutionalization of DSS.
- Integrating implementation and institutionalizations processes of decision-support systems is vital.
- Implementing successful decision-support systems requires top management support; institutionalizing successfully the process requires broader organizational support.
- Evaluating and assessing decision-support systems is a vital ongoing process to provide a real-time response to changes occurring in the environment.
- Conducting continuous multi-level capacity development plans is crucial for the successful adoption, adaptation, and diffusion of decision-support systems within organizations.

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Chapter VII

A Proposed Framework for Making Decisions Dynamically in a Global Organisation

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Abstract

A proposed framework for making decisions dynamically in a global organisation has been developed. This framework enables data to be retrieved and analysed dynamically with the aid of technology. This chapter starts with the discussion of various types of global organisational and departments within a global organisation. It is followed by the investigation and identification of organisational data and decisions that make up the global organisation; it also examines the different enabling technologies that can be applied for information retrieval. The chapter concludes with a proposed framework for making decisions dynamically in a global organisation.

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Introduction

Organisational structures and strategies are the key elements used to differentiate the different types of global organisations. These organisational structures and strategies determine the control formations and the way that organisations make their decisions. A "global" organisation is known as a centralised hub where foreign subsidiaries are tightly controlled by the headquarters (Bartlett & Ghoshal, 1989). Global organisations are emerging as huge global information systems with a multitude of subsidiaries located around the globe. This information system contains critical data that needs to be categorised and organised, thus decisions can be dynamically and accurately made by management.

One of the major barriers that global organisations face today is a way to utilise data and information from their information systems to the best of their advantage. The departments and data located in global organisations are very similar to other types of organisations; the major difference here is the type of decisions that the global organisations make in regard to competitive advantage.

With these huge global information systems, global organisations require a mechanism or framework that allows the data in the information systems to be retrieved and analysed dynamically. A framework for making decisions dynamically in a global organisation has been proposed as the main objective of this study. This framework consists of three layers: data, technology, and decision.

In conclusion an example using intelligent agents and data mining is discussed. This example illustrates how the framework can be applied using the agent-based technology.

Literature Review

Global Organisation Structures

The type of strategy the organisation uses defines the organisation. Organisational strategy is defined by Hill (2003) as the actions that managers take to achieve the organisation's goals. These strategies have a direct affect on the way organisations make their decisions and distribute their information. Generally, there are four types of global models or strategies (Bartlett & Ghoshal, 1989; Karimi & Konsynski, 1991):

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1. Multinational organisation model (multinational strategy)
2. International organisation model (international strategy)
3. Global organisation model (global strategy)
4. Transnational organisation model (transnational strategy)

These four organisational models or strategies determine how the organisations carry out their business activities and operations.

The multinational organisational model is said to be a "decentralised federation" (Bartlett & Ghoshal, 1989). A "decentralised federation" means that each of the organisation's foreign units is permitted to modify the product and or service to suit their national conditions (Hill, 2003). In a decentralised federation the responsibilities, assets, and decision-making are widely spread. Thus the organisation treats its foreign national units as part of its "international portfolio." The subsidiaries in the multinational structure are fairly independent, although the headquarters maintains the financial controls on the subsidiary. The subsidiary must also report to the headquarters.

The international organisation model is said to be a "co-ordinated federation" (Bartlett & Ghoshal, 1989). A "co-ordinated federation" transfers knowledge and technology to their foreign subsidiaries that are less advanced in the market. These subsidiaries are able to adapt to their market and adopt different strategies (Karimi & Konsynski, 1991). Under the co-ordinated federation the subsidiaries are dependant on the parent company for new products, services, processes, and ideas, although some responsibilities, resources, and decisions are decentralised. This dependence allows headquarters to have more coordination and control over their subsidiaries. The subsidiaries are considered an integral part of the central domestic operations.

The global organisation model is said to be a "centralised hub" (Bartlett & Ghoshal, 1989). In this model the organisation focuses on marketing a standardised product worldwide (Hill, 2003). This "centralised" structure allows the headquarters to tightly control the foreign subsidiaries. These subsidiaries are limited to the sales and services of the product. Their main role is to implement the policies and procedures developed by the headquarters. The headquarters considers their subsidiaries as a channel to a unified global market.

Transnational organisation model is said to be an "integrated network" (Bartlett & Ghoshal, 1989). In this integrated network the subsidiaries are viewed as a valuable source of information, ideas, and skills, which can benefit the organisation. The organisation is able to coordinate the foreign subsidiaries as well as give these subsidiaries the ability to respond to their foreign interests and preferences.

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Decision Making in Global Organisations

Decision making in general is a complex process; it is even more complex in global organisations where the organisation's subsidiaries are spread across geographical regions. Depending upon the strategy that an organisation adopts, the division of decision making is different.

The decision making in multinational organisation is widely spread across the subsidiaries. Generally the strategic decisions are decentralised and the headquarters only have a simple form of financial control on the subsidiaries. The subsidiaries have the control of modifying products and services to suit their national needs.

In international organisations the decision-making is decentralised only to a certain extent; the subsidiaries are dependent on the parent company for ideas, processes, products, information, and services. These subsidiaries, however, are able to adapt to their local environment and make their own strategic choice with the guide from the headquarters.

Global organisations, however, have tight central control of their decisions, resources, and information (Karimi & Konsynski, 1991). Since global organisations have such tight controls over their subsidiaries, senior management usually performs decision-making. Subsidiaries are considered as a "channel," or way to deliver the goods and or services. Therefore subsidiaries do not have the ability to modify the product and or service.

In a transnational organisation the decision-making process is supported by a complex process of coordination and cooperation in an environment of shared decision-making (Karimi & Konsynski, 1991). This is due to the way these organisations treat their subsidiaries, a source of valuable information and ideas.

Information Systems and Decision Support for Global Organisations

There are various forms of information systems; these include: transaction processing systems, management information systems, executive information systems, global information systems, decision support systems, and knowledge-based systems. Within these information systems lies the data that is needed for decision making. Table 1 is a summary of the types of information systems, taking note that it is not possible to list all the types of information systems that are in use.

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Table 1. Comparison of information and decision support systems

Name	Characteristics
Transaction Processing System (TPS)	- Collects and stores data about transactions. - Data editing, data correction, and data manipulation. - Elementary day-to-day activities of an organisation. - Provides summarised data for decision-making.
Management Information Systems (MIS)	- Provides information to organisation's managers. - Provides standardised or predefined reports. - Generates information on performance, coordination, background information of organisation. - Extracts and summarise data from TPS.
Executive Information Systems (EIS)	- Computerised information system. - Provides easy access to information from different sources. - Provides organisational performance data, internal communication, and environment scanning. - Designed for individual use. - Displays data in an interactive way.
Global Information Systems	- Data communication network that crosses national boundaries. - Accesses data and process data across these boundaries. - Able to link up with foreign subsidiaries' information systems.
Decision Support Systems (DSS)	- Interactive, computer-based information system. - Offers information and data and analysis models to assist in decision making. - Used for the support of structured and ill-structured decisions. - Produces reports. - Conducts decision analysis and obtains responses to queries.
Knowledge Based Systems (KBS) or Expert Systems	- Supports and automates decision making in an area where experts are better suited to provide answers. - Constructs conclusions or answers based on the information it receives. - Uses rules to determine conclusions.

Using Artificial Intelligence to Support Decision Making

The use of artificial intelligence (AI) to support decision making is a relatively new field, although expert- and knowledge-based systems have been designed based on AI principles. Table 2 summarises three types of AI technologies that can be applied to the decision-making process.

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Table 2. Three types of AI technologies for decision-making process

Name	Characteristic
Case-Based Reasoning (CBR)	- Based on the idea of locating past cases that are similar to the current case. - Decision support technique. - Provides knowledge on the case.
Intelligent Agents (IA)	- Autonomous, goal-directed computerised process that can be used to perform background work. - Qualities include: reactivity, proactiveness, and social ability. - Ability to sort and filter data.
Neural Networks	- Also called connectionists networks, systems that are interconnected artificial neurons. - Information system that can recognise the objects and different patterns based on the examples that have been used to guide it. - Built assuming that no explicit knowledge exists, using a mathematical technique.

Dynamic Decision Making

According to Busemeyer (1999) dynamic decision making is defined by three common characteristics:

1. Series of actions taken over time to achieve an overall goal,
2. Actions are interdependent, since later decisions depend on these actions, and
3. Environmental changes are spontaneous and/or a result of earlier actions.

The literature in this field is mostly divided into two parts (Park, Kim, Yi, Jun, & Moon, 1996). First the researchers conduct rigorously controlled experiments to construct rigid computational models of dynamic decision making and second they research the concerns of dynamic decision-making in real world problems.

Park et al. (1996) have proposed a framework for dynamic decision making in the real world at macro level based on the cognitive theory of problem solving. Their research is based on conducting three experiments using simulated management games to examine the relationship between the strategy used to search the dual problem spaces (this consists of a model space and a decision space) and the resulting dynamic decision being made.

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Furthermore the study determines the amount of inferences made in the model space and how the performance is affected when making dynamic decisions in pairs or alone. Literature in this area is diverse. There are many articles on dynamic decision making theories and models (Roe, Busemeyer, & Townsend, 1999).

Global Organisation Departments, Data, and Decisions

General Global Organisation Departments

Global organisations are made up of a variety of different departments that work together to ensure that all data and information is up to date. It is often hard to synchronise data and information due to time zones, language barriers, and the geographical locations. It is important to remember that global organisations have a highly "centralised" nature, in that all decisions are made at the headquarters and foreign subsidiaries only carry out and implement the procedures and policies set out by the headquarters.

Generally speaking, it is impossible to list all the different types of departments in a global organisation since each organisation is involved in a particular type of field. This framework focuses on the general departments that can be found in any organisation, including global organisations. According to Daft (2001) there are four departmental groupings that can be applied to the organisational structure; these are: functional grouping, divisional grouping, multi-focused grouping, and horizontal grouping. For this study the global organisation departments will be in the functional grouping form (Figure 1).

Figure 1. General departments in a global organisation

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The management department here is in a global text, that is, in a true global organisation the management department oversees the subsidiaries on behalf of the headquarters.

General Global Organisation Department Data

The following descriptions of data for each department are very general; it is not possible to list all data types found in each department, so the following types of data are just a general list. It also good to note that the data types can belong to more than one department.

1. Data in the management department consist of subsidiary, region, country, financial performance, financial budget, corporate resource, stakeholder, corporate image, audit, meetings, corporate strategies, legislation, policy, standards, guidelines, security, insurance, and international laws.
2. Finance and accounting data consist of account, asset, liabilities, funds, financial performance, payroll, invoice, receipt, vendor, customer, and subsidiary information.
3. Data in the human resources department consist of employee, compensation benefits, contractor, incentives, job, policy, union/industrial relations, training, and development information.
4. Production data consist of product, production, storage, raw material, machinery, packaging, labelling, policy, and standards.
5. Data in the procurement and purchasing department consist of import, raw materials, purchase product, and vendors.
6. Sales department data consist of product, service, customer, region, retail store, policy and standards, and inventory.
7. Data in the marketing department comprise products, services, promotion, market, survey, competition, customer, economic trends, industry trends, policy, strategies, and guidelines.
8. Information technology (IT) department data consist of system, software, network, architecture, policy, standards, guidelines, strategic IT plan, business continuity plan, disaster recovery plan, technology resources, security, and infrastructure.
9. Data in the research and development department consist of new products, new services, ideas, global standards, resources, and subsidiaries.
10. Data in the business development department consist of business strategies, investment strategies, market research, financial performance, international laws, legislation, policy, standards, and guidelines.

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Types of Decisions Made by Global Organisations

Decision making is fundamental in any organisation; the decision making in global organisations is more complex. This is because global organisations are more competitive in nature; this "competitiveness" affects the way managers make decisions and how they evaluate new opportunities (Leontiades, 2001).

As a result of this new competitive behaviour, this section deals with the types of decisions that are made that can enable the global organisation to gain a competitive edge against its rivals. The decisions listed below are categorised in accordance with the business functions and can exist in any organisation; however, the main focus of these decisions is based on global organisations.

Finance and Accounting Department

In global organisations the finance and accounting department plays a major role in the monetary sense, as it literally pulls the financial strings. To gain a competitive advantage, the global company should take into account the whole organisation's financial status, including its subsidiaries.

The decisions vary from being common decisions that are found in any organisation, such as decisions regarding the financial budget, procurement of goods, and so on. There are other decisions that can enable the organisation to gain a competitive advantage. These decisions may be identified by some questions such as "do we posses the necessary funds to start up a new subsidiary?" and "what is the exchange/interest rates of country x?" and "do these exchange/interest rates affect our production sales?" and "what are the subsidiaries' performance for the financial year" and so on.

Furthermore, the financial and accounting department relies heavily on the control of management and the headquarters. The department's major responsibility to global decision-making is to forecast the organisational profitability, that is, to transform the income statements of the organisation into decision-useful information and to link this information with business and investment strategies.

Human Resources Department

Competitively speaking, the types of decisions that could be made concern the recruitment of employees and creating and developing the policies, guidelines, and procedures.

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The decisions include "what procedures and guidelines must this subsidiary have, depending upon the main business operations that are assigned to the subsidiary," "reducing the number of employees on a global scale," "hiring of local managers or overseas managers to manage subsidiaries," "decision to keep or to move executives and managers to different subsidiaries," and so on. These decisions are made with the headquarters' support. The department should find the best person to fit the position; it must develop procedures and guidelines, and this is imperative since the organisation relies on these employees to carry out the everyday tasks of the organisation. Thus it is a competitive advantage for the organisation to streamline its employees and procedures.

Production Department

To enable the organisation to compete globally, this department (which is under the control of the headquarters and management) must develop standardised products that can be sold anywhere, although this may not always be the case, since products can vary depending upon the requirements of that particular market. Since the headquarters controls the subsidiaries in global organisations, subsidiaries have little or no say in the way they produce the product; they must follow the guidelines and procedures set out by the headquarters.

The decisions that are likely to give the global organisation a competitive advantage may include "the decision to produce the products at a lower cost," "deciding what subsidiary would best develop the product for a cost-effective price," "the level of products to produce," "strategically placing production plants in certain areas," and so on.

These decisions are also based on the tax, legislation, laws, currency, and political issues of the country the subsidiary resides in (Ball, Wendell, McCulloch, Frantz, Geringer, & Minor, 2002).

Procurement and Purchasing Department

Here competitive advantage is apparent. The decisions that this department makes can have an overall effect on the way the organisation succeeds. The types of decisions that this department can make include "deciding where to buy raw materials," "reducing the supply chain," "whether or not it will benefit the organisation to make links with suppliers," "allocating appropriate procedures and guidelines to procured goods," "whether it is viable to purchase raw material in country x, when country y (the subsidiary that needs the raw material) is located on a different continent," "minimise logistics and distribution delay," and so on.

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Sales Department

The main purpose of the sales department is to sell goods and/or services to the consumer. There is a close relationship between the sales and marketing department. This department also deals with the management of customer relationships.

The decisions made in this department are very common in any organisation, which include "whether or not it is worthwhile to incorporate a customer relationship management system," "deciding what particular group (demographic) of customers that the product is aimed for," "deciding upon the cost of services and products, specials, sales, and so forth," "deciding if it is necessary to set up call centres or help lines for customers," "types of sales strategy to various markets," and so on.

Marketing Department

The marketing department plays an important role in securing competitive advantage as it develops the strategies to "market" or "advertise" the organisation. The types of decisions that can be made by the marketing department include "when to conduct in-depth market analysis," "whether or not the alliance with other companies to promote the organisation's products and services can aid the organisation," "what type of marketing strategy should be used for different demographics, including country and culture," and so on.

Management Department

This department is responsible for the overall operation of the organisation; to gain a competitive advantage the management department should be able to coordinate and streamline its functions and subsidiaries together.

The decisions involved in this department may include "is it viable to invest subsidiaries in country x?" and "what strategy is the best approach for the production of goods?" and "what procedures and policies must each department implement?" and "deciding on the management structure and personnel for a subsidiary" and "deciding upon the level of control that each subsidiary has."

There are many more decisions that the management department carries out, but these decisions are everyday type decisions, or, in other words, decisions that are very common in any organisation.

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Information Technology Department

The information technology department's main purpose is to create, implement, and maintain the networks, software, and system architecture of the organisation. This department works closely together with the management department to align the business processes with IT.

There are many decisions that are made within this department. Competitive advantage can be in the form of the organisation's network (speed, quality, durability).

The types of decisions that can be made in this department include "deciding upon the network structure for a subsidiary," "type of system architecture and IT infrastructure," "whether to store data externally or to have a local copy and mirror sites," "type of technology to be used (hardware and software)," "what types of data exchange and data interchange platforms to use," "strategies or methods to operate global IT infrastructure," "types of network standards and policies," and so on.

Research and Development Department

The decisions made by the research and development department are a crucial part of "staying competitive" and/or gaining a competitive advantage. The main purpose of this department is to research and develop new innovative products and/or services.

The types of decisions being made by this department may include decisions such as "deciding on the amount of funding and manpower that is needed," "strategies to detect market trends," "type of product, idea, service will be researched and developed next," and "cost-effective strategy".

The research and development department needs to work closely with the marketing and production departments. It is imperative that this department does an in-depth analysis to discover the changing needs of the consumer; as these needs change, so to does the product.

Business Development Department

The purpose of this department is to research and define the business strategies that can be applied in acquiring new subsidiaries, new business opportunities, and, most importantly, who the organisation has an alliance with or merges with. Creating a "global presence" is crucial for competitive advantage, thus this department must conduct a thorough investment analysis to decide whether or

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not the appropriate investment will lead the organisation to have a global presence and a competitive advantage.

The types of decisions that can be made include "is country x suitable for opening a subsidiary?" and "is it to our advantage to have an alliance with company x?" and "deciding on the appropriate strategy to acquire a business opportunity" and so on.

Ranking the Different Types of Data

Data found in global organisations are usually stored in some sort of database, whether it is a combination of relational databases, transaction databases, or object-oriented databases. In relation to our research focus, once the data has been gathered from the global organisation's databases via some technological mechanism there is a need to sort and filter the data that has been gathered to aid top management's decision making.

As mentioned earlier, a way to retrieve data and information from huge databases is using data mining. Basically data mining can be defined as extracting or mining knowledge from large amounts of data (Han & Kamber, 2001), and/or is a process of nontrivial extraction of potentially useful information that was previously unknown (Chen, Han, & Yu, 1996).

When decision makers query their databases, huge amounts of data can be retrieved, and if this retrieval of data is relatively extensive, there must be a mechanism that sorts the relevant data from the data that has been retrieved. With the use of data mining one can specify the exact query using SQL-like statements but written in a data mining query language. A data mining querying language enables the data mining system to support ad hoc and interactive data mining to assist in flexible and effective knowledge discovery (Han & Kamber, 2001).

Furthermore, there is also another factor in data mining — text-based databases. A text-based database is a large collection of documents from multiple sources such as articles, news, books, and research papers (Han & Kamber, 2001). As global organisations contain huge amounts of documents that contain semi-structured data, the text-based database can be considered a goldmine of potential knowledge. This knowledge is potentially useful for the research and development departments in the global organisation.

Another possible way to gather information from text-oriented documents is with the use of XML (Extensible Mark-up Language). XML can be used to convert text-oriented documents into standardised interface to allow for the reorganisation of information; the XML documents can then be transferred to a database.

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Data Ranking and Filtering

The data mining process filters out noisy data as well as dealing with the integration, selection, and transformation of data.

With huge amounts of data being sourced from the global information systems' databases, it is imperative to filter and rank this retrieved data. The ranking process depends on the type of decisions being made. An example would be the decision made to evaluate the investment of foreign subsidiaries. The retrieved data may include financial data (such as expenditure description, expenditure amount, expenditure date, financial budget amount, and financial budget date) from the finance and accounts department, and research data from the business development department. Although the decision was put through by the business development department, the ranking of data here would be the financial data and then the business development data.

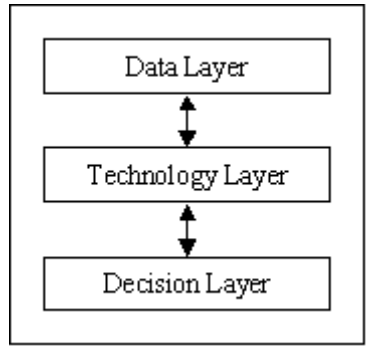
A Proposed Framework for Making Decisions Dynamically in a Global Organisation

As mentioned in the literature review, a "global" organisation can be seen as a "centralised hub" where foreign subsidiaries are tightly controlled by the headquarters. As information and data are constantly being updated from the foreign subsidiaries, top management needs a way to make decisions dynamically with the most current information.

The previous section described the departments, data, and types of decisions that could be made by global organisations. This section aims to describe a proposed framework for making decisions dynamically in a global organisation.

The framework consists of three layers (Figure 2).

Figure 2. A framework for dynamic decision making in global organisations



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The data layer consists of data that is contained within the global organisation's information systems. The technology layer is the underlying technology that is used to gather and rank the data. The decision layer activates the technology layer by invoking the underlying technology.

Data Layer

The data layer is the underlying global information systems; this layer contains numerous databases. The global information systems will generally have a centralised database, but with foreign subsidiaries maintaining and controlling their own local databases, the centralised database is constantly being updated from various foreign subsidiaries. The type of data in the departments of a global organisation has been covered in the previous section.

Technology Layer

The technology layer is the underlying technology that is being used to unearth the data that the decision requires. There are many types of technology that can support decision making, such as decision support systems, executive information systems, management information systems, and knowledge or expert systems. This technology can also include intelligent agents, neural networks, and case-based reasoning. The purpose of the technology layer is to gather the data and information from the global information system's database. It then invokes data mining to clean, integrate, select, and transform the data into useful information and or patterns via a visualisation technique.

The technology layer will invoke data mining algorithms when the data has been gathered. Data mining will enable the data that has been gathered to be cleaned, filtered, and integrated before sending the information back to the decision maker.

Decision Layer

The decision layer is the first layer of this framework as it is the one that invokes the underlying technology in the technology layer to gather and analyse the data. The type of decisions that a global organisation can make has been discussed in the previous section.

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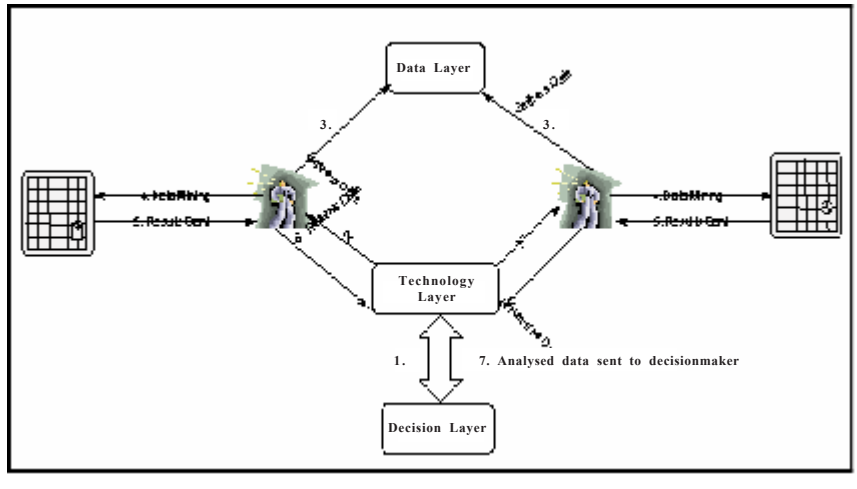
An Example of the Proposed Framework with the Use of Data Mining and Intelligent Agents

This example aims to display the way the proposed framework will work. It uses intelligent agents to source and/or gather the relevant data from the global information systems. As mentioned in the literature review, intelligent agents are an autonomous, goal-directed computerised process that can be used in a computer system or network to perform background work while other processes run in the foreground (Alter, 1999b). Figure 3 depicts the flow of actions occurring after a decision has been entered.

The steps are:

1. A decision is being sent to the technology layer.
2. Technology layer invokes the underlying technology, in this case intelligent agents.
3. Intelligent agents then gather the data from the global information system.
4. The intelligent agent then uses data mining to clean, integrate, select, and transform data.
5. Data mining mechanism then sends the results back to the intelligent agent.
6. The intelligent agent then communicates with the technology layer to send information back to the decision maker.
7. Data and information are sent to decision maker.

Figure 3. Using intelligent agents and data mining



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Conclusion

Global organisations are emerging as huge global information systems. These information systems contain data and information that may be critical in decision-making. In this study, the global organisation has been broken down into three components, namely, departments, data, and decisions. A framework for making decisions dynamically in global organisations has been developed. This framework incorporates three layers, data, technology, and decision layer.

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Chapter VIII

Decision Support and Data Warehousing:

Challenges of a Global Information Environment

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Abstract

This chapter is dedicated to the major managerial, organizational and technological aspects of development of data warehouses in a global information environment, when different external sources of information are available and potentially may have value for decision support and managerial analysis. It summarizes the major benefits that become available for businesses if they decide to integrate information from external sources into their data warehouses. It also introduces the overall organizational framework of development of data warehouses that are based upon the information from different external sources. Furthermore the author hopes that understanding of the framework introduced will not only inform practitioners (both information technology (IT) specialists and managers

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in different spheres of business) of new possible approaches to design of decision support systems but also assist in the improvement of approaches to decision-making procedures.

Introduction

Data warehouses play an important role in the automation of managerial analysis and in decision support. The main purpose of this technology is to accumulate and organize information in order to make it useful for analysts and decision makers. Usually technical specialists and managers are concerned with the development of data warehouses that are based on information from operational information systems located within the organization. However any business is influenced by external factors and oriented to the external business environment. Hence information about the surrounding world and economic conditions may sometimes be more important for creative analysis and decision making than internal information. That is why the presence of valuable information in different external sources and its potential value for decision making make it necessary to integrate external information into corporate information flows, thus making data warehouses more valuable to analysts and managers.

On the one hand development of data warehouses that contain information from external sources is a non-trivial task that may appear to be an expensive exercise in terms of both financial and non-financial resources. On the other hand selection of adequate strategies for the usage of information from external sources may determine the overall efficiency of a business and its competitive power in our age of global information systems and rapidly changing business conditions.

The main objective of this chapter is to describe the major potential benefits that may arise for decision makers as well as the major challenges that systems integrators and managers will face if they decide to follow the strategy of integrating into the global information environment.

Background: The Nature of Data Warehousing

Corporate decision support tools and management information systems are commonly oriented around the accumulation of information from scattered

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sources and their further processing. Data warehouses usually are used for amalgamation of information from different storages (like operational data stores and transactional information systems) and their preparation for further processing that usually involves flexible reporting, online analytical processing, data mining and other similar approaches. Such functionality is achieved through use of so-called "multidimensional data bases" – data structures that organize information into virtual "data cubes." Managerial analysis and decision making are supported either through application of specific mathematical tools (such as data mining) or through providing a means of flexible data manipulation (such as online analytical processing).

Development of such data warehouses has become possible due to the wide use of information systems in the support of different routine business operations (such as accounting information systems, MRP, CRM, PDM, and so forth). In other words the introduction of data warehouses usually represents a natural continuation of development of operational information systems introduced into major business spheres.

Initially the development and maintenance of data warehouses that accumulate heterogeneous information was a difficult task for developers, system analysts, and field managers because of the following major reasons:

- Absence of standards and unified approaches to information storage as well as procedures for its processing (information about the same or closely related business phenomena may be processed asynchronously in different local databases);
- Absence of unified approaches to identification and naming of different business processes and phenomena across organizations (the same business phenomena may have different identifications); and
- Absence of unified hierarchical classifications of the existing business phenomena (identifiers of different business phenomena in different operational systems may be grouped and classified in accordance with different rules).

The significance of these difficulties and importance of data warehousing development for business stimulated the concentration of the attention and efforts of many specialists on this subject. Over the course of time significant experience was accumulated in the field of organization and running of such information systems, and a relatively independent discipline was even established (data warehousing) that formalized and systematized all the major problems, procedures, and solutions that are specific to this field (see, for example, Gray & Watson, 1997; Inmon, Imhoff, & Sausa, 2001; Reinschmidt &

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Francoise, 2000). Establishment and common acceptance of this discipline are illustrated by the fact that, for example, Microsoft Corporation not only has separate software products that more or less successfully implement data warehousing concepts (for example, analysis services) but also has a separate specialists certification program (see, for example, Nolan & Huguelet, 2000) together with certification programs in software development, database administration, and other fields.

Besides this, the evolution of data warehousing technology was influenced by the use of integrated enterprise-wide information systems that provide a single platform for all the major spheres of business responsibility within a company (sales, procurement, production, human resources, finances, and so forth).

Comprehension of data warehousing as a distinguished discipline and its successive development allowed the achievement of the major goals that are important in any sphere of IT management:

- Render the overall development process more controllable and clear in spite of all the technical and organizational difficulties;
- Discover and predict the major difficulties that may potentially hamper the development of data warehouses; and
- Estimate the consumption of required resources at different stages of a data warehouse development project.

As a result, the introduction of data warehouses has almost become "just another" type of software development project that requires specific more or less well-known tools, skills, and approaches to software design and project management.

Integration of Data Warehouses into a Global Information Environment: The Major Perpsectives

The next step in the development of information technologies primarily discussed in this chapter — globalization of the information environment — has provided significant potential for further development of decision support systems and opened new horizons for them. It has presented new opportunities for deeper and more flexible managerial analysis as well as for making more well-grounded and sound decisions and consequently gaining new competitive advantages.

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Certain specialists and researchers describe in their works some aspects of integration of information from different external sources in order to make data warehouses more useful and valuable for decision making:

- Inmon (2002) outlines the major technical difficulties related to dealing with external information sources (totally undisciplined and unstructured data, unpredictability of external information sources' behavior, and some others) as well as certain software engineering solutions
- Certain difficulties specific to particular situations are described in several scientific works. A good example of such research work is presented by Galhardas, Florescu, Shasha, Simon, and Saita (2001). They describe a situation when it was necessary to integrate unstructured library information from a particular external information source into a data warehouse (difficulties and solutions).

In our opinion systematic usage of external information sources for corporate data warehousing should not only be regarded as a technical issue with data warehousing technology, but it should also be interpreted as part of an overall managerial and technological strategy. This would, on the one hand, require policymakers' support at different organizational levels and, on the other hand, have significant potential for development of competitive advantages and growth of the market value of a business.

That is why systematic integration of information from external sources and possibility to achieve significant results (improvement of decision making through advanced decision support) should be supported by a consistent methodology that describes the initial development process as well as the ongoing support of all the elements of such data warehouses. Such methodology should be focused on major opportunities, tasks, and approaches to dealing with the typical problems that may occur during the development process. In particular it should be based upon comprehensive analysis of the following aspects:

- Opportunities that become available for analysts and managers whose decisions are supported by the data warehouses in which information from external sources is imparted — the major possible advantages should be clearly presented to both decision makers (data warehouses' potential users) and system integrators in order to make the process of development more oriented to management information needs.
- Situations in which there is integration of information from external sources and corresponding organizational and technical challenges — different

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types of information sources should be classified in order to clearly differentiate the major possible organizational and technical strategies that should be applied in each particular case.

- Major approaches (technological issues and organizational methodologies) to dealing with the difficulties that are typical for integration of information from the external sources – different technological solutions and organizational methods should be described with regard to the major challenges connected with the external sources of information that is important for decision making.

Consistent provision of these three elements of the methodology should lead to one benefiting from the availability of numerous external information sources and being able to systematically deal with the major problems that are typical with integration of these sources into corporate data warehouses loading processes.

Opportunities Provided by External Information Sources

In most cases the potential of data warehouses and external information flows significantly depend on many subjective factors, such as:

- Decision-making culture and approaches to decision making that are typical to a particular organization;
- Nature of the business; and
- Analytical skills of the decision makers who use (or potentially may use) data warehouses and OLAP tools.

However, in our opinion it is necessary to outline the major, relatively universal, potential opportunities that may be provided for managers who want to conduct a deeper managerial analysis and make more well-grounded decisions. The major opportunities that become more available for managers and analysts who use such information systems for managerial analysis and decision making are the following:

- Ability to compare their business characteristics with the behavior of competitors and other entities (suppliers, consumers, and so forth);
- Ability to analyze dependencies between business performance and macroeconomic indicators (like inflation, level of unemployment, and so forth); and

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- Ability to use more up-to-date external information for analysis and decision making (prices of production factors, and so forth).

Detailed analysis of major types of external information is presented in Table 1.

Such a summary of external information sources' possible applications may be practically used (at least initially) as guidance for field managers and decision makers. In particular it should help them to determine and demonstrate what business problems require the development of such "advanced" data warehouses.

Table 1. External information sources and their possible use

Information	**Its Possible Use**	**Possible Spheres of Decision Making**
Macroeconomic indicators (GDP, etc.)	Estimation and analysis of possible fluctuations in consumption of goods and supply of production factors.	Marketing, budgeting, production planning. Strategic planning
Financial indicators (rates of exchange, inflation, etc.)	Estimation and analysis of possible competition in international markets and competition with foreign competitors in domestic markets	
Economic indicators that characterize the behavior of customers and target markets	Estimation and analysis of future sales and incomes	
Social indicators (structure of the population in particular regions, its dynamics)		
Economic indicators that characterize the behavior of suppliers and service providers	Estimation and analysis of future expenses (costs of the goods to be produced)	
Performance indicators of competing companies and partners (profitability, sales volumes, assets turnover, and others)	Analysis of a market situation. Development of key performance indicators for a company. Estimation and analysis of future sales and incomes.	
Indicators that characterize the behavior of adjacent markets (substitute goods, compliment goods, sales volumes, profitability, etc.)	Analysis of the development of new products and positioning of the existing ones. Estimation and analysis of future sales and incomes.	

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Integration of Data Warehouses into a Global Information Environment: The Major Challenges

The availability of the opportunities described will completely depend on the availability, quality, and organization of the information in the external sources as well as on the organization's ability to complete complicated projects and its commitment to flexible and well-grounded decision making. That is why such a company will have to adopt new organizational approaches as well as new software engineering solutions and technologies that could provide a solid base for efficient and adequate accumulation of information from scattered sources in a global information environment for its further integration into corporate decision support systems. The problem of development of data warehouses in a global information environment has much in common with the development of data warehouses within the scope of corporate information systems (we have already mentioned those difficulties and tasks). But on the whole it significantly differs from the implementation of data warehouses that use information from local databases:

- External information environment and data in it (data sources, data formats, access interfaces) may change significantly, and these changes may be made without taking into account how they influence the behavior of the entities that consume this information.
- Information collected from external environment practically cannot be improved and adjusted in accordance with the needs of organizations that consume (or potentially may consume) it.
- Technologies of storage and presentation of data in an external information environment may be numerous, and some of these technologies may be unavailable for the organization that wants to include external information into corporate data warehouses.

That is why development of analytical tools and integration of information flows from a global information environment into corporate analytical information systems will require new approaches, skills, and technologies. Particularly development of analytical tools and decision support systems that use external information sources will require dealing with both organizational and technological difficulties.

The most important objective of this chapter is to analyze the major challenges that analysts, managers and developers will face if they decide to integrate

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information flows from a global information environment into corporate data warehouses and decision support systems.

Our approach is based on the classification of external information sources, which is done by taking into account their major characteristics.

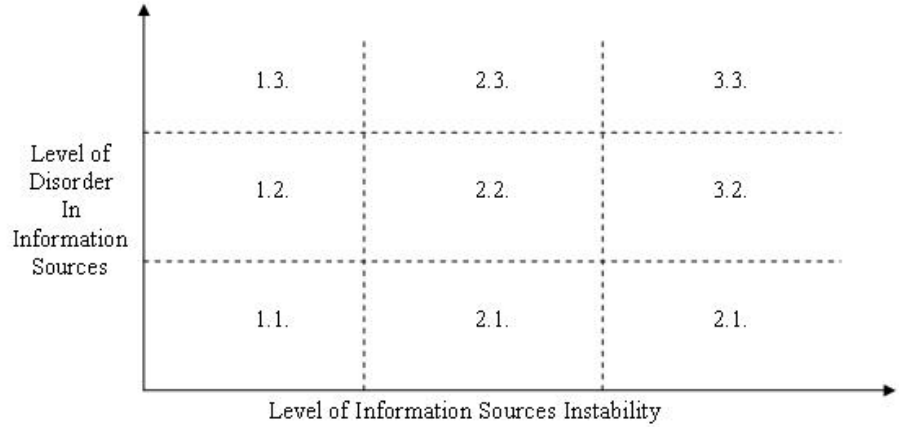
Figure 1 presents the classification of the major types of information sources with regard to two of their characteristics:

1. Level of information sources instability – characterizes the probability of more or less significant changes in external information sources. This level may vary from absolutely stable (when information sources change very seldom) to highly unstable (when the structure of information, its logical structure, data formats, structure of information sources, and storage technologies change often).
2. Level of disorder in information sources – demonstrates how structured and formalized the information in external sources is and whether it is acceptable for automated processing (data transformation) and feeding into highly structured data storages (like data warehouses) or not.

This level may vary from absolutely formalized presentation of information (for example, in table format) to absolutely informal presentation (for example, in textual form that requires either human involvement or artificial intelligence tools for formalization and further data transformation).

We have used three-point scales for the analysis of both these characteristics in order to simplify this model and make it more understandable. For further reference we shall use the phrase "information source of type #.#" (where #.#

Figure 1. Classification of the major types of external information sources



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is an identifier of information sources disorder and instability levels in accordance with a Figure 1) to identify different types of external information sources. For example, "information sources of type 1.1." corresponds to information sources with low level of instability and low level of disorder (lower left corner of the diagram).

Such classification is crucially important for the analysis of external information sources in the event of their integration into corporate data flows because the possible instability of external information sources and informal (or insufficiently formal and consistent) presentation of data in them make such data sources different from the sources residing within a company. In our opinion the estimation and analysis of external information sources' characteristics should be made every time when a company decides to use such sources in its data warehousing process.

The information sources that are characterized by a low level of instability and a low level of disorder may be consistently and relatively easily used for corporate data warehousing and decision-making support, whereas sources that are characterized by a high level of instability and disorder can hardly be integrated into a corporate data warehousing process. In any case project managers and data warehouse developers will have to use specific techniques and methodologies. The difference is that the closer a particular information source is to the sector 3.3, the more risky and resourceful the integration of this source into a data warehouse will be and the more consistent management will need to be for implementation and support of such information flows.

Both these characteristics significantly influence usage of external information sources for systematic support of managerial analysis and decision making. Hereinafter we analyze two major aspects of risks and difficulties connected with use of external information sources: technological challenges and organizational challenges.

Technological Challenges

One of the most important technical issues connected with the systematic dealing with external information sources is that data in these sources may be presented in different formats. It usually assumes that data sources are characterized by:

1. Presence of mixed and unstructured textual and numeric data
2. Possible simultaneous use of different approaches to presentation of the same (or similar) information
3. Absence of relatively clear rules that could describe the structure of data (for example, use of natural forms of data presentation).

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In order to handle such information efficiently and feed data warehouses correctly, it will be necessary to understand the rules in accordance with which data are organized and develop corresponding data transformation tools. Moreover it may be necessary to implement an analytical model that could formalize raw information for further processing. As a result of this, the business that decided to use data from external information sources will need to significantly progress the major elements of the software development process:

1. Use advanced techniques of system analysis;
2. Employ mathematical tools for analysis of unstructured data; and
3. Develop software modules that implement complicated algorithms for data analysis and extraction.

These techniques and approaches may be unknown to the company's IT specialists and as a result significant expenses may be required for:

- attraction of external specialists and development companies;
- acquisition of new software (reusable modules, libraries, and components);
- training of company's IT-specialists;
- attraction of new employees (programmers, system analysts).

Practically every company will have to handle the problem of unstructured information in external sources. But actual expenses and the possibility of eventually using the data from external sources will completely depend on the characteristics of the external sources, which we have already discussed in the previous subchapter (levels of information sources instability and irregularity in data structure).

In one situation a business may try to use external data sources that are highly structured (for example, when numeric information is presented in formalized tables) and stable (when rules of presentation of this information remain unchanged). In this case integration of information flows from external sources into corporate data warehousing environment will practically come to implementation of new data transformation modules that may be quite similar to some other data transformation modules that have already been developed by the company's specialists (especially if a business has certain experience with transition from legacy systems).

In another situation a business may try to involve external data sources that are not structured, and the manner of data presentation changes from time to time.

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Implementation of data transformation tools may be very complicated and time consuming both for system analysts and for software developers. Transformation of data from such external sources may even become a separate business process if this information is crucial for decision making. (This is mostly an organizational issue. We discuss it in the following subchapter.)

Another important technical issue is that access to data in the external sources may require development and maintenance of various interfaces that are not typical for information systems currently used within a company. In most cases software developers may have to deal with different Internet protocols with which they are unacquainted. The major difficulties with this aspect will be practically the same as the ones that we have discussed with regard to dealing with data formats: implementation may require additional educational efforts, purchasing of additional software and hiring of additional specialists. But the difficulties in this case will probably not be so significant, as data access interfaces are relatively universal and practically always remain unchanged due to one major reason: transitions to alternative operating systems and other fundamental changes in information systems infrastructure are usually much more expensive than changes in data presentation formats.

Organizational Challenges

Organizational difficulties connected with integration of information from external sources into a corporate data warehousing process are probably more important and challenging than the technological ones. Situations that may require special attention of managers and specific organizational techniques may be faced at different stages of the data warehouse lifecycle and at different organizational levels. Major challenges may arise in the following situations (data warehouse life cycle stages):

- Initiation of data warehouse development or initiation of integration of information from external sources into existing data warehouses;
- Development of new data warehouses and data marts or improvement (extension) of currently used ones; and
- Current use of data warehouses that contain constantly updated information from external sources.

A situation of data warehouse improvement initiation when a company may decide to use (or not to use) information from external sources presents two major organizational issues:

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1. It may be necessary to organize monitoring of different information sources' availability and their assessment regarding objective business analysis requirements in order to provide the basis for further initiation of the external information sources' practical use.
2. It is also necessary to organize qualified selection that fit the needs of managers and decision makers, from a variety of available external information sources.

The quality of the results of such information requirements analysis and monitoring of external sources significantly depends on the commitment of field managers and experts. That is why this activity should be motivated and supported especially accurately.

At the stage of development or improvement of data warehouses, one of the major organizational challenges will be to organize the collaborative work of field specialists and system analysts in order to formalize criteria and algorithms for extraction of information from external data sources. It is crucially important to find and motivate analysts for such work because the tasks to be handled in the system analysis process are usually non-trivial, based mostly on field experience and intuition and require a creative approach. Special attention should be paid to the hiring of new specialists and attraction of external software developers, system integrators and consulting companies that specialize in particular relatively narrow fields of software development and business analysis (like, for example, automated analysis of natural languages).

Besides that, as we have already mentioned, at the end of this stage the organization may have to organize a separate business process for the support of data transformation processes. Such a business process may be necessary for ongoing support (adjustment) of data transformation tools. It should include monitoring of the overall correctness and adequacy of data transformation algorithms, correction of data analysis algorithms, and redesign of software modules that implement these algorithms.

Another important issue at this stage of data warehouse lifecycle is to set a clear policy regarding quality of information added to the data warehouses from external sources. In particular all the field analysts and decision makers involved should clearly understand that certain assumptions have been made during the data transformation modules development process, and for this reason the presentation of the information inside the data warehouse may not always be correct. The major risks of information mishandling and its inadequate transformation and presentation should be identified and potential users should be informed about them.

At the stage of current use of data warehouses that contain constantly updated information from external sources, one of the major challenges is to prevent the

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possible negative influence of changes in the external information environment on current business operations. It may be the disappearance of the information sources currently used in the corporate data warehousing processes and/or changes in these sources. In particular organizations should have special plans of actions in such situations (preferably a separate plan for every external source used):

1. All the analysts, decision makers and stakeholders should be timely notified about the changes that took place; and
2. Unexpected changes in the external information environment (and consequently changes in the information stored in the data warehouse) may require urgent reorganization of analytical and decision-making procedures in order to preserve the company's overall manageability.

Almost all the organizational issues described also comply with the model we have introduced in Figure 1. The information sources of type 3.3 (and partially adjacent ones) will require a more consistent management and attention to support information flows. In particular if a business uses external information sources that suffer from lack of stability and formalization of data presentation, it should develop and introduce clear organizational rules: determine procedures, assign responsibility, identify resources to be used in different situations, or even reorganize certain business processes. For external information sources of type 1.1 such special procedures and organizational techniques may be implemented only partially and cannot be regarded separately.

Future Trends

So far we have discussed the major theoretical and practical concepts related to data warehousing in a global information environment that form the background for productive work in this sphere. But the problems of such development should not be considered only as a set of local technological and organizational difficulties and corresponding techniques that can help to deal with such difficulties (like the ones we have discussed in the previous subchapters). It also has significant perspectives at higher organizational levels.

Further considerable improvement of decision support procedures through integration of different information sources and storages in a global information environment will require significant advancement of the overall corporate decision-making culture and encouragement of thinking in terms of global information environment. Such culture should be based upon:

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- Educational background of both IT specialists and field experts involved in decision-making procedures (here we mean mostly higher education as a base of overall management and software development culture).
- Permanent support of orientation to involvement of additional information sources into corporate data warehouses in order to make the decision-making environment more efficient and useful for managers and specialists at different levels.

Both these aspects require significant resources (both financial and human); additional education may be expensive and support of corporate culture will consume managers' time and other resources. But only in this case will the competitive advantages of use of external information sources be achieved and allow a business to perform better than its competitors. Development of methodology for support of such culture should be a subject for a separate research in the future, when we get enough practical experience in implementation of data warehouses that use information from external sources.

Another prospective aspect of the problem discussed in this chapter that is worth mentioning is of a global nature. The importance of flexible automated information processing and integration of information flows from a global information environment into corporate information systems (especially analytical and decision support systems like data warehouses) should enforce the development of a certain culture of presentation of data in a global information environment. Formation of such a culture may become apparent in the form of a certain commonly accepted agreement (or a set of agreements) — sets of rules that reflect the best practices of data presentation in a global information environment. Such best practices should be developed with respect to the major considerations and rules (some of which are contradictory) that are presented in Table 2.

One of the simplest illustrative examples of such an agreement is to restrict usage of graphical file formats (like GIF or JPEG) for presentation of potentially valuable textual and numeric information that is available in a global information environment. The importance of such an agreement for automated data processing (and therefore for support of data warehouses feeding processes) results from the fact that the analysis of graphical data is much more difficult (from the software development point of view) than the analysis of data presented using, for example, XML and/or HTML format or stored in relational or other similar databases.

Another more "advanced" example of such commonly accepted agreement about data presentation and structuring is a family of RSS standards (see, for example, Obasanjo (2003) and Nottingham (2002) for further reference). It is a

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Table 2. Factors that may influence acceptance of agreements on presentation of data in a global information environment

Factors that ***restrict*** acceptance of information presentation agreements	Factors that ***stimulate*** acceptance of information presentation agreements
1. Entities that make their information available in a global information environment present their data in a way that best meets their needs and is less expensive (in their opinion) 2. Information sources owners cannot coordinate all the changes in the rules and forms of presentation of data in a global information environment with the consumers of this information	1. Use of commonly accepted rules may attract additional users 2. Use of commonly accepted rules produces a positive image for the business and potentially may be a part of a corporate PR policy

widely accepted standard for presentation of semi-structured data on the World Wide Web that helps to automatically fetch information from the Internet and process it in accordance with the users' requirements.

In the future, development and wide acceptance of such culture (and corresponding agreements) will probably become possible when the overall information environment becomes mature enough. In particular, such maturity may be connected with:

- Appearance of a sufficient number of companies that extensively use external information sources in important business processes (like decision support) and that consequently may influence the overall business environment;
- Future development of technologies for presentation of data in a global information environment;
- Increased competition between companies that make available different data in a global information environment.

Conclusion

We have discussed the major issues any business will have to deal with if managers and stakeholders decide to improve the overall decision-making

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process through usage of external information sources for feeding corporate data warehouses. One of the most important aspects is that the concept presented in this chapter describes both organizational and technical aspects related to such integration. These aspects have almost equal significance and, moreover, in situations when external information sources are characterized by a high level of instability and contain highly unstructured data, organizational issues may be even more important than the technical ones.

It is quite difficult to formalize procedures, criteria, and requirements for the process of such integration due to the same reasons that are typical to "ordinary" data warehouses. But at the same time additional difficulties are unavoidable because such "globally integrated" data warehouses significantly differ from the ones that are based only upon data sources located within the company's information systems (like ERP, MRP, CRM, and others).

This chapter provides an overview of the major theoretical concepts and practical issues related to data warehousing in a global information environment. It provides a comprehensive understanding of factors that are important for the use of external information sources, starting from the description of an external information source's role in corporate data warehouses and its importance for decision support to the analysis of major managerial challenges that are unavoidable in industrial practice at different levels of management and at different perspectives. The importance of such complex understanding is based upon the fact that support of decision making by flexible presentation of appropriate external information is vital for overall integration of businesses into a global information environment and the establishment of a connection between business goals (especially the needs of managers, analysts, and decision makers) and information systems development. That is why the concepts and overall vision presented in this chapter should help field managers and information systems developers to prepare themselves and their companies for work in new conditions.

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Chapter IX

Web Services and Their Impact in Creating a Paradigm Shift in the Process of Globalization

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Abstract

This chapter explores the impact of Web services in creating a paradigm shift in the way businesses strive to globalize. This fundamental shift in the paradigm of the globalization process occurs due to the fact that with Web services, it is not one single organization that starts dealing with its clients electronically but, rather, a number of organizations (a cluster) with common needs and complimentary services to offer that start dealing with each other electronically. Web services enable business applications to talk directly with each other without human intervention, resulting in rapid interactions among businesses at a global level. This opens up doors to the interesting phenomena of a group, or "cluster," of businesses globalising simultaneously, as studied in this chapter.

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Introduction

Many information and communication technology (ICT) industry observers believe that web services technologies herald the next major wave in online computing and electronic business resulting in communication and integration of application services across varied technical chasms of operating systems, networks, databases, and security protocols. In fact increasing experience with web services indicates that they bring an altogether different dimension to the terms "e-business and globalization" (Unhelkar, 2003b). The impact of Internet and web services (WS) bring about a noticeable paradigm shift in terms of what is meant by a global business, how the business relates to other businesses, and how it manages its own internal processes that might themselves be geographically spread out. Most importantly, though, for this discussion is the manner in which an existing business transforms itself into such a global business – in other words the process of e-transformation or globalization. The Web has enabled businesses to explore hitherto unknown frontiers, a view also corroborated by Deshpande, Murugesan, and Hansen (2001), who correctly assert:

"With the advent of the World Wide Web, 'computing' has transcended the traditional computer science, information systems and software engineering in the sense that these three fields were strictly within the domain of a computing professional whereas the Web reaches the 'world.'"

Web services ascend even this "traditional" understanding of the Web and make it imperative upon both technologists and business people to re-interpret the terms "Web" and "globalization." This is so because web services enable business organizations to transcend the "enterprise divide" that exists both between and inside organizations. In fact web services appear to hold the key to erasing international computing boundaries and have left the door wide open to globalisation and automation of tasks (Unhelkar & Elliott, 2003).

This chapter discusses in detail the specific impact of web services on the nature of, as well as the approach to, electronic globalisation of businesses. It delves in detail as to how web services have brought about a change in the way a business globalizes itself. Electronic transformation of an individual business is relatively well understood and has been studied by various authors, including Lan and Khandelwal (2003). Furthermore, frameworks for such e-transformation exist and have been published by various thinkers and practitioners in this field (see Dowding, 2001; Ginige, Murugesan, & Kazanis, 2001). However all of these frameworks are currently focused on the transformation of a single organization. Web services provide the ability for a cluster or a group of organizations to e-

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transform simultaneously. It is this cluster-based e-transformation that creates the paradigm shift and is the mainstay of this chapter.

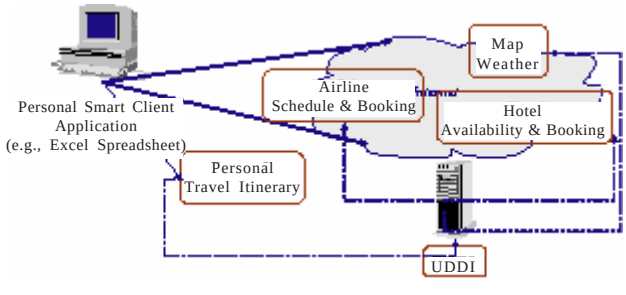
This chapter starts with a simple example of how web services differ philosophically from the standard web applications. This is followed by a discussion of the various ways in which businesses have been utilizing the Internet. This understanding is essential in clarifying how the business world has arrived at collaborations with each other. Collaborations form the backbone of business clusters. We then briefly define and discuss the technical aspect of web service technologies, leading up to the discussion on how the process of e-transformation has become fundamentally different due to web services as compared with the normal e-transformation process. The shift in the transformation process from the standard business to business and B2C models of a single organization to transformation of a group of collaborating organizations is made evident. Finally a high-level road map of cluster-based globalization is offered.

Web Services: Business Interpretation

In order to understand the differing perspective between the needs for and the process of electronic transformation of a single business versus that of a cluster of businesses, it is first important to clarify what web services entail and how they differ from web applications. The understanding of this difference will lead to further understanding in terms of the effect web services have on electronic transformation of businesses. We can study this difference through an example.

Consider, as shown in the example in Figure 1, an individual traveller attempting to automatically calculate airfare, car rentals, hotel tariffs and so forth across the globe and in various denominations. This will require the various providers of

Figure 1. The need for various businesses to collaborate with each other in order to satisfy the requirements of a single requirement (or a single business process)



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these services — who are themselves geographically and temporally in wide and varied zones — to have their application services coordinate, translate, interact, and resolve the queries on a wider and complex scale. The ability of large number of applications belonging to different organizations and operating in different technical and operational environment interacting with each other is facilitated by web services. In this example, there is a need for the airline and hotel companies to interact with each other on a much broader scale electronically, in order to satisfy the demands of the individual. This interaction, however, is not through persons or departments within these organizations but, rather, through software applications that are web service-enabled. This leads to the client's "Personal Smart Client Application" to electronically deal with the applications of the various service providers in resolving the demands of the individual client. As compared with this electronic application-to-application interaction, normal web applications would require the client to access the web sites of each of the service providers manually and compile her own travel itinerary, make bookings, and consider various alternatives in arriving at the choices of car and hotel rentals. Web services make all of this happen automatically!

Furthermore, if we consider the possibility of the customer side itself being made up of a large number of businesses, we come to understand the enormous possibilities for clusters or groups of businesses to make use of the electronic medium to conduct their businesses. In fact this has the potential to lead to restructuring of entire industries rather than merely individual businesses. Industries such as banking, insurance, financial, health care, government bodies, shipping companies, airlines, and telecommunications providers are bound to undergo radical changes in the way they provide information, conduct e-commerce, organize themselves internally, and collaborate among each other. Therefore it is quite appropriate to go beyond considerations of reengineering of business processes and move towards what may be known as industrial process reengineering (IPR). Eventually, the impact of web services may lead to not only changing the face of business but also the redistribution of revenue and market share within entire industries.

The stakes are very high. However the risks are worth taking for the risks commensurate with the rewards that the business world as a whole is likely to gain. Loosely defined business clusters, interacting dynamically with each other, are bound to create vast business opportunities, far greater and improved services, and a truly open world market. This may, at certain points within the electronic transformations, require intervention from industrial bodies and even government as during this globalization process, smaller organizations may tend to lose out due to lack of awareness of the transformation process. Not being a part of a cluster or a collaborative group of businesses that are transforming electronically may lead to closing down of a business in the new paradigm. To obviate these possibilities, it is important to study how a cluster or group of organizations undergoes electronic transformations, as is being done here.

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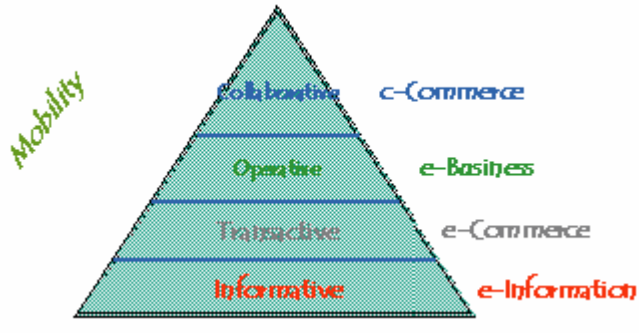
Business Utilization of the Web

While the term e-commerce has been used in a sweeping way to encompass all aspects of electronic business, there are subtle as well as significant differences between the implied meanings behind usage of various terminologies. This meaning is congruent with the way business has utilized the Internet (Unhelkar, 2003b). Figure 2 shows the ways in which business use the net and the evolving levels of this usage.

Informative Business

The very first era of Internet utilisation was primarily focused on information provision and sharing. This informative aspect of the Internet (e-information) is the most basic, most common and therefore the widest usage of the Internet by the business as shown as the base layer in the triangle in Figure 2. This usage encompasses all the provisions of the informative aspect of the business to the world. At a very basic level, it is scanning the company's product brochures and putting them up on the Internet, resulting in what has been known as the Brochureware. This usage also included putting up the basic company contact details like phone, fax, and physical address (equivalent of a business card on the web). Thus this use of the Internet by business is primarily for branding its products or services, and communicates in one direction only. Because of this, informative sites have minimal security requirements and need minimal maintenance. Given the primarily uni-directional mode of electronic communication in this form of Internet usage, there was hardly any need for collaboration between businesses. Therefore this form of usage required minimal attention in terms of

Figure 2. Increasing levels of utilization of the Web by businesses leading up to collaborative usage (based on Unhelkar, 2003b)



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electronic transformation of businesses. Globalization was limited to availability of information rather than conducting business transactions, resulting in a large number of businesses in this layer.

Transactive Business

The informative usage of the Internet by businesses was rapidly followed by the transactive usage, commonly referred to as e-commerce and shown in the second layer of the triangle in Figure 2. This "Transactionware" included two or more parties (businesses) involved in conducting a transaction (that is, trading with each other) through electronic data interchange (EDI). Although e-commerce is a term used to refer to anything and everything related to the Internet, it actually means this transactive usage of the Internet by the business. This involves ability to send and receive messages and thereby conduct business transactions by communicating with the business behind the web interface. These transactions can be broadly categorised into two:

- Simple transactions that deal with inquiries, making of bookings/reservations, and posting feedback.
- Financial transactions that involve a third party (such as a bank or Visa card) that facilitate sale and purchase of a commodity (enable commerce).

In both cases, the transactions can be B2B (business to business) or B2C (business to customer). While this transactive aspect of the business would usually start with B2C, almost all global organizations would be involved in B2B transactions. It should be noted here how the evolution of the Internet usage by businesses from informationware to transactionware requires cooperation between two or more parties. This lays the foundation for what we are discussing in this chapter — the issues to be considered when businesses are collaborating with each other over the Internet. However, before businesses evolved to a stage where they could fully and openly collaborate with each other, they also discovered that there is more to the Internet than merely dealing with external businesses.

Operative Business

Ensuing from the growing commercial usage of the Internet was the understanding that businesses could also put up their own internal operational aspect on the Internet. As shown in the third layer of the triangle in Figure 2, this came to be

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known as operative usage of the Internet. It included handling of not only the informative and transactive capabilities, but also the management of internal operations of the business such as inventory, payroll, HR and the like. This results in not only increased internal interactions of the employees with the business but also B2B interactions of the business with external entities that deal with organizing the internal processes (for example, an external accounting firm dealing with the general ledge and accounting entrees of the business under consideration). Thus due to traversal of a business' internal processes with its customers, suppliers, and other businesses, there is a large component of B2B transactions in operative businesses. In addition to impacting B2B transactions, because of the ability of the business to shift all its operations on the Internet, this usage of the Internet by businesses usually has a component of business-to-government (for example, taxation) in it. Thus when all the operational aspects of the business are moved on to the Internet, the business can be called e-business. When organizations evolve from informative and e-commerce sites through to e-businesses, they discover that this transformation is fraught with challenges arising due to existing legacy applications and data within the organization and setting up of business alliances and standards between various external parties. Therefore many strategic planners of e-businesses have recognised the benefits of undertaking a complete redesign of their Internet business strategies and have implemented a more holistic approach to their operative business. Reaching from e-information to e-commerce to e-business is leading the organization toward a collaborative environment. However it is still not a fully collaborative environment, as it deals specifically with known internal and external parties. So what is open collaborative environment in electronic business? We consider that next.

Collaborative Business

The top layer of the Internet usage triangle, shown in Figure 2, is where numerous businesses started collaborating with each other simultaneously using the electronic medium. Thus when a cluster or group of businesses start interacting with each other openly and without pre-determined business partners, it results in the collaborative type of usage of the Internet by businesses. During this use of the Internet, businesses realised that it is much more advantageous to collaborate with a large number and cross-section of businesses that may be spread far and wide geographically but that may have complementary business offerings than to merely conduct electronic commerce and handle internal business operations on the Web. What ensued is creation of open portals and electronic marketplaces (for example, eBay). It is this collaborative usage of the Internet by businesses that has found significant impetus by the advent of web

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services and is of primary interest in this discussion. This usage is further discussed after a brief mention of the effect of mobility on these various layers of business usage shown in Figure 2.

Mobile Business

Mobility influences all aspects of Internet usage. For example, together with the GPS (Global Positioning System), the Internet virtually frees the customer from time and place dependence. The boundary between the traditional Internet-based systems and mobile applications is already blurred. The result is that mobile technology permeates all four aspects of the triangle discussed in Figure 2.

Mobility influences the informative aspect of the triangle when information is posted to mobile devices by the business.

When transactions (of both types — simple and financial) are carried out over the net by using mobile gadgets, it is m-commerce. This includes trading on the mobile devices.

When all business aspects are handled over the net using mobile devices, it is m-business. Examples of m-business include managing car breakdown services using on-board mobile gadgets or tracking couriers.

Mobility adds a unique dimension to the globalization process and is in itself a separate paradigm. However it is part of a substantial discussion that needs to be addressed separately from the current discussion. It will suffice to mention here that mobility makes connectivity totally independent of space. While the standard Internet communication makes business-to-business relationships independent of time and physical space, still a local physical connectivity is required. Mobility, however, transcends even that requirement of physical connectivity. Indeed that is the direction in which the entire business world is moving and therefore worth mentioning here for potential discussion on clusters of wireless business. Currently, though, we delve deeper into the collaborative usage of the Internet.

Collaborative Usage of the Internet by Businesses

Collaborative usage, as shown on the top-most part of the triangle in Figure 2, builds on top of all previous layers. Thus, informative, transactive, and operative

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usage of the Internet is all imbibed in the collaborative usage, or c-commerce. In addition, collaborative usage leads a group of businesses to not only conduct business transactions with each other and thereby provide support to each other in electronic transactions but also create a veneer of competition amongst these businesses underneath the electronic layer. (See Kock, Davison, Wazlawick, & Ocker, 2001 for further thoughts). This judicious combination of support as well competition makes it imperative for the cluster of businesses to extend itself much wider, globally reaching out to its customers and suppliers in search of new avenues of services, including finding totally new combinations of services and products that could not have been offered without such collaborations.

However these collaborations need support at technical (Liu, Song, & Liu, 2001) as well as business level (Morris, 2002). Web services technologies have made this possible because web services enable many applications from many businesses to conduct business with each other without the need for human intervention. However, when it comes to collaborations, businesses are still coming to grips with the need to share resources, identify business values, and improve their comfort levels in terms of security and privacy. Thus while the technology itself is rapidly maturing, it has created a paradigm shift in the way businesses consider their strategies for transition to electronic business. Despite the challenges, however, it is becoming obvious to businesses that it is much more advantageous to collaborate with each other than merely going global on their own. Collaborative commerce enables collaborative relationships between a network of organizations enabling them to buy and sell their products and services electronically, thereby making these transactions cheaper as well as reaching a wide range of market. As Fairchild & Peterson (2003) discuss, the presence of c-commerce indicates a network of firms with similar collaborative natures with established collaborative business platform and strategies. Despite its understandable slowness in catching up, it is this collaborative nature of Internet usage that is bound to provide maximum advantages to businesses both in terms of globalization and in managing their own internal processes effectively. Having thus underscored the significance of collaborative business, let us now briefly consider the technologies that enable this collaboration to happen.

Web Services and Global Business

Emerging Technologies

What are web services? How have they evolved to the stage where they are, and what were the precursor technologies that lead to web services? Until now, most

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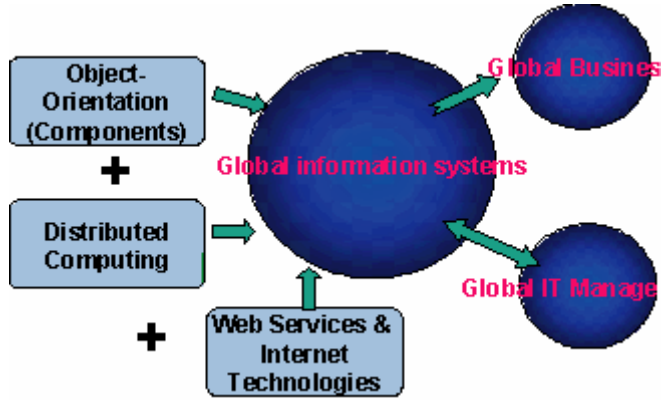
electronic business depended on a customer at the other end using an electronic facility to conduct business. Even when two businesses were interacting with each other, it was the people within the businesses that were using the applications, perhaps on the Internet, in order to interact with each other. Thus the preliminary web applications used the same concepts as normal application developments and, as such, relied heavily on the concepts of object-oriented or, in its more sophisticated form, component-based software development as shown in Figure 3. Objects and components had their own small-time effect on global information systems as they facilitated reuse of components developed by "third parties." This led to interactions among software applications on a dedicated basis, and the technologies such as Distributed Component Object Model (DCOM), Common Object Request Broker Architecture (CORBA), and Remote Method Invocation (RMI) came into play. Thus distributed computing increased the pace of interaction among information systems, leading to further globalization of businesses as shown in Figure 3.

Component technologies and distributed computing has now evolved into web services and Internet technologies, as shown in Figure 3. As compared with distributed computing, where the platform for distribution was a dedicated one with web services, the exchange of information and data is primarily through document-based XML that can be easily exchanged between software applications on a wide variety of platforms (for detailed discussion on comparison of these technologies, see Chaturvedi & Unhelkar, 2003). Since web services provide a standardized way by which applications can communicate across networks, regardless of their size or the computing platform on which they are

Figure 3. Evolution to technologies from the fundamentals of Object-orientation, distributed computing through to the Internet technologies including web services



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executing at either end of the interaction, there is a genuine independence achieved by businesses in interacting and collaborating with each other. This is not only a different paradigm in terms of how businesses relate to each other but ensures a paradigm shift in terms of transformation of business to e-businesses. The underlying theme of business interactions has shifted to A-2-A, or an application-to-application business relationship, opening up the doors to automation of business decisions, business processes, and sharing of business tasks — in fact, an unlimited array of opportunities in the realms of electronic business. As Sanjiv, Cantara, and Shetty (2003) state:

"Web services will ease partner-to-partner interaction, make application integration easier, create new business opportunities, give businesses more and better choices, give enterprises competitive advantages over rivals and improve efficiency in trusted environments."

With standardization and automation of business transactions, changes particularly in data-reliant professions such as banking, government statistical bodies, shipping companies, airlines, telecommunications providers, and the financial industry are apparent. With such high stakes, the manoeuvring of industry competitors such as IBM, BEA, Microsoft, and Oracle to reach a favourable position in the market can now be seen (Unhelkar & Elliott, 2003).

Core Elements of Web Services

IBM defines web services as "self-contained, modular applications that can be described, published, located, and invoked over a network, generally the Web. The web services architecture is the logical evolution of components geared towards the architecture, design, implementation, and deployment of e-business solutions" (Gottschalk, 2000). Kirtland (2001) gives the Microsoft viewpoint: "a web service is a programmable application logic accessible using standard Internet protocols. Web services combine the best aspects of component-based development and the Web". While other companies, including Sun Microsystems, have their own definitions, what is commonly agreed upon is that web services are applications designed and built around component-based software, that they are self-describing and can be invoked using standard Internet protocols. Technically web services technologies can be broken down simply into three major and easily recognisable areas, as shown in Figure 4.

More specifically, these layers are: the XML/SOAP protocol and packaging layer; the WSDL definition layer; and the UDDI discovery layer. The XML/SOAP provides the basic means of transferring document-based information

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and data across the Internet. The WSDL helps define the meaning behind the services, and the UDDI layer helps publish and locate services. While not so comprehensive, many similar attempts to provide similar framework have existed in the past, including the DCOM, CORBA, and RMI solutions discussed earlier. While those middleware components promised a lot, they were marred by the lack of "open" technologies. With web services, though, the promise is of open connectivity. While still struggling with the lack of proper industry-wide regulation at the current stage, the web service technologies have far more potential and far more to offer to businesses. This difference in the fundamentals of web services technologies and what they have to offer can be understood by studying their technology meta-model further.

A Web Service Meta-Model

The technologies of web services mentioned in the previous section can be summarised into a meta-model that represents the various major elements of web services and how they relate to each other. Such a meta-model is shown in Figure 5. This meta-model, based on the work done by Monday (2003), makes it easier to understand the web services technologies from a business or usage perspective and thereby form the basis of understanding the shifting paradigm in the globalization process. In Figure 5 we see three major components of web services and their relationships:

Figure 4. The major technology areas involved with the current application of web services (Unhelkar, 2003b)

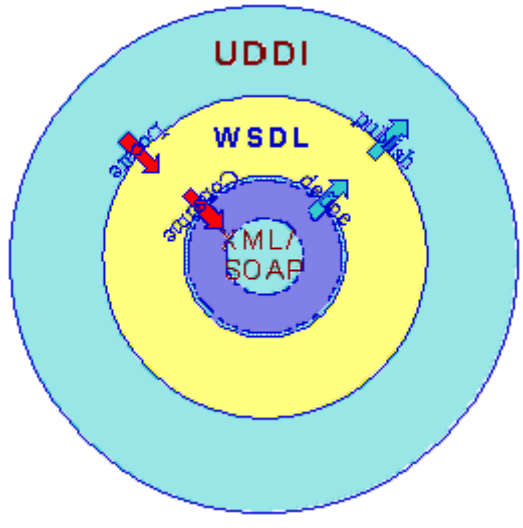

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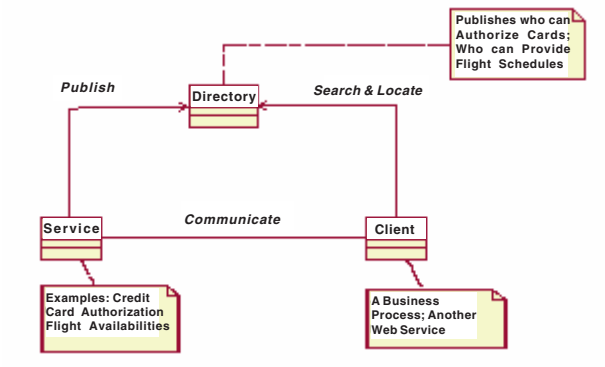
Figure 5. A static web services meta-model (class diagram; based on Monday, 2003)



The service shown in Figure 5 is a type of application, stereotyped as a <<service>> that is being offered by the business that has the capability to do so. The "service layer" defines the programmatic interface for other applications to interact with the web service, usually in the form of an XML file. As is obvious, businesses that aspire to operate globally will have to ascertain the types of services they want to offer, handle the business models for such services, and eventually seek ways to publish their services onto a common directory.

Such business will register their service with a <<directory>> provider such as UDDI. This is also known as the "discovery layer" and is designed to provide a standardised way in which web services can be centrally registered, located, published, and controlled. This is shown by the directory class in Figure 5. The existence of a directory is a major discerning factor between what would be a normal Web application and a web services-based application. The challenges in terms of standardizing the contents and ensuring their availability are not yet fully handled but are issues that impact the way in which a cluster of organizations may decide to globalize their operations.

Location and consumption of a service by a <<client>> is another major difference in the way web services operate. Here, through web services, the clients (such as, say, a bank or a travel agency) have the freedom to put together various offerings as may be available through the directories to provide their own customer wide variety of choices. The array of permutations and combinations that <<client>> can obtain through use of web services makes the process of globalization a different phenomena than the normal web applications. Following on from location is consumption of the service, which would again require technological standards and capabilities that are provided at a fundamental level by web services.

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The possible implementation of the service provider and the consumers can be through any of the web services technologies such as .NET or SunONE. Furthermore it is worth noting that the entire scenario depicted here is conducted by software applications and not humans. This is one of the major causes of paradigm shift in web services-based e-transformations. Let us now consider in detail the impact of these fundamentally different ways of publishing and accessing business information and services on the Internet.

The Shifting Paradigm in Global Transformation

The aforementioned technologies and capabilities of web services have resulted in an environment wherein the stage is set for massive interaction between businesses across the globe. This is an ICT-based globalization as against the pre-communication era globalization that relied primarily on physical alliances between organizations. It is worthwhile to mention this earlier globalizations as a means of comparing the shifting paradigms between the two types of globalizations. For example before the advent of web services (even while the businesses were using the Internet-based connectivity), the globalizing organizations had to set up associations and alliances with each other. Some of the physical alliances took the following formats:

- Proprietary ownership of a globalized organization wherein the individual owned the business spread physically across borders.
- Joint ownership or partnerships; these relationships meant that individuals owned a certain percentage of the organization, and it was quite common for individuals from different physical regions to cooperate in order to conduct global trade.
- Private limited (individuals + banks/money lenders/venture capitalists).
- Public (unlimited participation + banks/VCs).
- Trusts, wherein ownership was not easily defined, but which provided opportunity for organizations to expand their horizons through a mutually agreed “third party.”

These alliances were necessary during earlier processes of globalizations and were in fact there to provide the formal and, as far as possible, legal infrastructure for the globalization processes. The above alliances may still be necessary,

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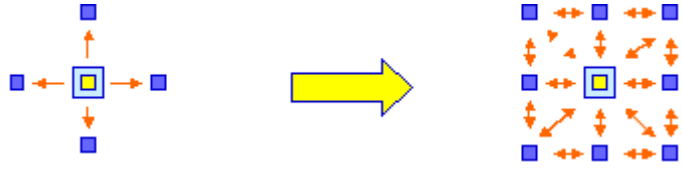
but their formats have undergone rapid change. The legal and accounting capabilities are still trying to catch up with this transformed way of doing business. And they will have far bigger challenges as the business world moves toward large-scale cluster-based e-transformation. This is because the need to form physical alliances in order to tap into each other's client basis, business partners, and abide by government regulations still exists. However these physical alliances have already started undergoing redefinition as a prelude to the overall paradigm shift resulting from web services, as discussed in the remainder of this subsection.

A Cluster-Based Transformation

The discussion on web services thus far clearly indicates that not only are businesses dealing with each other through their applications but also that there are numerous businesses that start conducting electronic business with each other simultaneously as a result of web services. This is because once the standards for the directory service are established, it is possible for large number of businesses to register their "services" in the "yellow pages" of the directory. This results in collaboration between businesses on a grander scale, based around common business interests, or clusters (discussed in detail by Unhelkar, 2003b). Therefore in order to successfully e-transform businesses that are registering their offerings through web services, as well as sourcing their needs through web services, it is crucial that a group or cluster of businesses e-transform simultaneously. As shown in Figure 6, a genuinely collaborative business will no longer be at the exclusive centre of the business world and will not be satisfied or successful by merely e-transforming its own self. Instead each business that e-transforms and uses web services will play an ever-increasing greater facilitating role, shown on the right side of Figure 6. Customers and other business partners are all able to interact with each other before and during their

Figure 6. In cluster-based e-transformation, focus shifts from independent e-transformation to interdependence and collaborative arrangements (Pradhan, 2002). Thus a business is no longer at the center of events; instead, many businesses start dealing with each other, leading to an all-to-all electronic market. (Unhelkar, 2003a).



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transactions with the collaborative business. Once this model is extended to many businesses, we have genuinely open markets that truthfully espouse the principles of free trade. While numerous roadmaps exist that help organizations transition from the left of Figure 6 to its right (in particular, the work of Kalakota and Robinson (2000) has been quite popular in this regard, as has Ginige et. al. (2001) on e-transformations of SMEs), I am offering here some basic phases for a cluster-based e-transformation.

Comparing Shifting Paradigm

Having described what a cluster is and how the cluster-based e-transformation is interdependent from the participating businesses, we now summarise it in a tabular form in Table 1. This table shows comparatively the various aspects of e-transformations and how they are affected when an organization attempts independent e-transformation as compared with a cluster-based e-transformation. Although this table is not exhaustive, it provides relevant comparisons between the two "paradigms," leading to a greater understanding of the differences between the two paradigms and their importance in e-transformation.

The shifting paradigm summarised in Table 1 also forms the basis for a framework around which cluster-based e-transformation framework can be created. An attempt to outline such framework is made in the next section.

Framework for Cluster-Based Electronic Transformations Leading to Globalization

The discussion so far has argued how web services facilitate creation and transformation of a collaborating group of businesses. The primary understanding created thus far is how the technological capabilities of web services enable creation, publishing, locating, and consumption of services offered by a large number of businesses simultaneously. The overall scope of the e-transformation process, and the shifting paradigms of cluster-based e-transformation, was summarised in Table 1. This section expands and builds on the summary of Table 1 and outlines the framework that can be applied to ensure successful e-transformation of a cluster. Needless to say this requires more than mere understanding of the technological capabilities of web services. A number of primary issues have been identified by Unhelkar (2003b) in cluster-based electronic transformation. These issues include:

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Table 1. Comparison between independent and cluster-based e-transformations

Aspect of e-Transformation	Independent e-Transformation	Cluster-based e-Transformation
Customer	Customer remains an "outside" party	Cluster members themselves can be customers and suppliers.
Technology	Centralised; basic Web technologies. No directory services.	Web services are essential. Directories of services also mandatory.
Infrastructure	The organization itself has to work on creating the e-infrastructure; invest in bandwidth and security.	This is usually handled by a third party, with the cluster members contributing to its creation and usage.
Alliance needs	Not much work needed in forming business alliances, as it is primarily a customer-to-business relationship.	Extra work needed in ensuring fairness in competition when a cluster e-transforms – especially cross-border alliances.
Software Designs	Standard e-business designs starting with a Web site and leading to e-commerce and e-business.	XML, WSDL, and UDDI have to be modeled and implemented in cluster transformation. Intra-cluster standards are mandatory.
Conversion	Necessary, as far as transition is concerned.	Only common or "contributing" data and programs need to be converted; rest of the applications may simply be interfaced.
Change Management	Internal training is crucial, as also is ensuring customer awareness of new processes.	In addition to internal and customer-related changes, there are crucial changes between cluster members.

- Cluster identification
- Capability evaluation
- Business alliance formation
- Knowledge building
- Standards consideration
- Cluster revenue models

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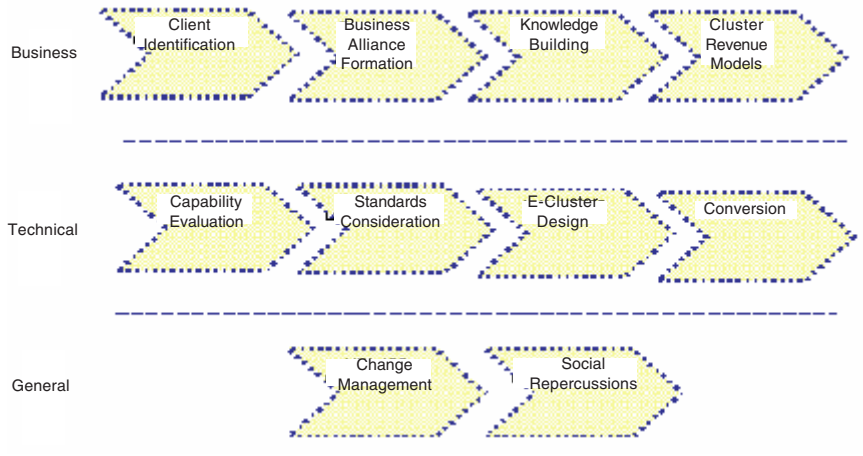
- E-cluster design
- Conversion
- Change management
- Social repercussions

As shown in Figure 7, these factors have been categorised into three major groups, which continue to influence, almost in parallel, the process of cluster-based globalization. The three major bands, or areas, as shown in Figure 7 are: business, technical, and general. The sequence in which these key factors or process-components can be executed depends on the particular situation of a cluster and the environment in which it exists. That sequencing is a matter of further process study and is not discussed here. We will delve deeper into each of these issues that make up the framework and the role they play in handling cluster-based electronic transformation of businesses.

Cluster Identification

Electronic transformation of a cluster starts with the identification of such cluster. While this can be a major and significant exercise that interested parties will undertake, it is also worth mentioning that a cluster may also "happen" due to unplanned interactions amongst a group of businesses. A single organization attempting e-transformation is not troubled by these needs of a cluster to identify its participating members in globalization. The starting point for identification of

Figure 7. Key process components of the framework form cluster-based globalization (e-transformation)



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such clusters is common business interests that are complementary to what each cluster member can offer and service. And given the phenomenal importance of customers in e-businesses (Siegel, 1999), it is the customer of the potential cluster that will also drive identification and creation of clusters that will serve the ever-expanding needs of a customer. Do note that, in a cluster, the customers and suppliers can also be cluster members themselves. Common business interests lead to common technological capabilities to form a cluster — a separate key point discussed in the next subsection. Once the business interests and technological possibilities have been vetted, the stage is set for legal formalization of the relationship between the initial members of a cluster as discussed in the business alliance phase. This can create a cluster that will technically be able to interact as a portal. However in this early stage of cluster identification, questions that need careful handling are: types of businesses, their common interests, possible competition amongst them, and the ability of the businesses to transact amongst themselves. If a firm has an existing e-business strategy, then that will be certainly of help in identification of an e-cluster. As Dowding (2001) states, "there is a direct correlation between management team's ability to first develop and articulate its corporate strategy and a firm's success with implementing a successful e-business initiative." Although this strategy is mentioned for an individual organization, having such a strategy is equally important in cluster-based e-transformation. For example it is easier to imagine a cluster made up of an airline, a hotel chain and a car rental agency, but the interesting business issues come into play when more than one airline or hotel chain or car rental agencies are trying to become part of the cluster. If there is proper business synergy, then such clusters will not always compete but rather cooperate in providing businesses to each other.

Capability Evaluation

Capability evaluation deals with the identification of the technologies and capabilities of individual members of the entire cluster. This also escalates into identifying the infrastructure capabilities that exist amongst the current members of the cluster. As with all major business decisions, incorporating the capabilities of the member organizations of the cluster as they stand in the planning of the e-transformation is an essential part of the success of the transformation and should not be hastily overlooked. The key to organisation success with implementation of any strategy is the creation of first a vision (Thompson & Strickland, 2001). This vision has to incorporate the technological and business capabilities of the organizations that are part of the cluster. As web services continue to evolve, such technological capabilities to interact will be a "given" rather than something to be created from the beginning. Still capability evaluation will be

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required to handle the ability to capitalize on the given technologies and will have to be undertaken by participating members of the cluster.

Business Alliance Formation

Once the common business interests start emerging and the technological possibilities become obvious, the primary members of the cluster move to formalize the business alliance. As compared with the globalization process of an individual organization, a cluster has to ensure that the members are cooperating with each other in terms of providing a product or a service. Formation of business alliances leads to creation of formal agreements that are very helpful when the technical members of the organizations in a cluster start interacting with each other in the knowledge-building phase. While some mutual agreements of the business alliances may be reached informally (for example, signing of a memorandum of understanding), formal agreements are required as a precursor to knowledge creation and documentation of the cluster. The soundness of business models will play a big role in ensuring the success of the transforming clusters. Thus e-transformation will not merely lead the businesses to deal with each other electronically. It will also require them to have physical alliances that will ensure fairness in terms of trading and sharing business values arising out of the clusters.

Knowledge Building

In this phase of e-transformation, there is a coordinated effort made in collating and understanding the knowledge that exists in and around the cluster. This is not the same as the technical work of collection of all databases of individual member organizations and putting them together. In fact, when knowledge-building commences, we will have a collaborating group of companies providing data and information about their businesses that, put together, is capable of providing more and innovative services to its customers. For example, a cluster based around hotels, airlines, and car rental companies will be able to collate and share travel patterns of common customers or, at a bigger level, travel agencies to enable provision of a complete and process-based service to the customers. Furthermore, in this example, the cluster will be able to proactively offer informative and transactive capabilities (based on Figure 1) that take care of the inter-dependencies between the hotels, airlines, and car rentals. This cluster is capable of handling an on-the-spot large order for air tickets and reservations because the members of the clusters may be more than one airline and one hotel. While the technology of knowledge-building still revolves around data warehouses, the

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mechanism of communicating that knowledge through web services is an important and imperative dimension to cluster-based e-businesses rather than a single e-business. It is searching for the common pool of knowledge, creation of new knowledge, and communicating that knowledge to all group members that makes up this phase of knowledge building.

Standards Consideration

One significant facet of cluster-based e-transformation that becomes apparent is the crucial need for standards at all levels. While standards are technically challenging, in cluster transformation the business aspect of setting up and using standards also comes into play. This is the reason for the significance of organizational bodies like UDDI (www.uddi.org), W3C, OMG (www.omg.org) and OASIS (www.oasis.org, which now also owns UDDI). These standard bodies create and facilitate common grounds for businesses to set up and accept standards, which can then be used for rapid automation of applications that belong to cluster members. These standards bodies can also facilitate increased offerings of services as the cluster matures in conducting electronic business transactions.

Cluster Revenue Models

Revenue models for a cluster are perhaps one of the most challenging factors in the e-transformation process of a cluster. This is so because the technologies of web services make it extremely easy for member businesses to transact with each other without putting any restrictions in terms of accessing each other's databases, client lists, and related services. Thus while web services facilitate interactions amongst businesses, they also create the challenge of identifying and tracking the business interests of each individual member of the cluster. For example, as is evident from Figure 1, in a travel cluster, the airline will have to share its information on the travel patterns and choices of a passenger with its business partners such as the hotel and the car rental companies. Such information, needless to say, has value in monetary terms. The challenge to revenue models comes from the fact that the airline also tends to benefit by sharing this information with the hotel and car rental agencies, as without such information, a potential client would not be able to customise and package his or her travel and may look elsewhere for the service he or she desires. Currently there are no published revenue models that would specifically cater to the needs of a cluster. However, research in this direction is starting (Pradhan, 2003) and points to interesting facts such as:

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- Equity in sharing "business value" rather than money;
- Keeping the customer first, irrespective of the revenue sharing;
- Due consideration to cross-border revenue sharing;
- Costs associated with creation and maintenance of a cluster-based information system.

Designing E-Cluster

Designing an e-cluster is a technical job. It will not merely result in a DNS (Digital Nervous System (Gates, 1999)) for a single organization but a DNS that spans many organizations. As such, the technology demands have to cater to the meta-model described in Figure 4. Thus it requires proper design of (a) the XML/SOAP wrappers surrounding the business applications that are to be web enabled, (b) the modelling of the WSDL, or definition language, that can be first understood by the members of the cluster and then be openly available to anyone who needs the service and is ready to pay for it, and (c) understanding of the directory services as provided by UDDI and the mechanism to publish and locate to and from the directory respectively. These technologies on which design of the e-cluster is based are different in their fundamentals and need detailed understanding of not only how a particular business will use the web but also how the group of businesses will do so (Unhelkar, 2003a).

Conversion

Web services are not all about wrapping up legacy software in service capsules. It requires a certain amount of conversion, primarily data, that is used by the cluster as against the individual business. This brings the issues of security and confidence to the fore as a common set of data dealing with a customer; that is, interacting with three different businesses (airline, hotel, car rental) is likely to be a source of consternation amongst businesses that had "owned" that customer alone. Similarly the services that are being offered by the cluster may be common for a customer, and to avoid duplication, conversion of data will have to drop data related to a service from all but one business. For example, earlier, before cluster transformation, each of the three businesses owned the name and address of a registered traveller. Now it becomes redundant for all three businesses to have the same data, as the customer is going to initiate only one transaction. As is obvious, this leads to more issues than basic data conversion in that multiple parties are involved in putting up their relevant data for services, and proper coordination amongst all of them is required.

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Change Management

Change management remains the most significant cause of any e-transformation success and failure and has been studied in detail by Lan (2003) and is also discussed by Unhelkar in another chapter on global e-business alliances in this book. It is important that this "soft," or non-technical aspect, of cluster-based e-transformations is considered seriously and as early as possible in the lifecycle of the transformation. While the planning for change management can start as early as when the clusters are identified, this phase is actually executed toward the end of the e-transformation process. Web services facilitate a group of companies to come together, and these groups of companies may not be physically in the same region. The geographical, political, and cultural boundaries that are transcended quite easily in electronic dealings take a while when businesses have to deal with each other as a cluster that requires corresponding physical alliance. Education and training go a long way in facilitating change management and should be incorporated in the planning process itself.

Sociological Repercussions

While change management is increasingly being considered in electronic transformations, and while it will be a key part of the strategies of a cluster-based transformation, still it is not the end in terms of "soft" factors influencing success of transformation. It is vital that the outermost fringes of "soft" factors, called sociological factors, are considered in a large cluster's electronic transformation. When a number of companies operate together in a cluster, it becomes essential that they operate with deference to the culture and social value systems of the other organisations and the societies and countries in which they have been operating. A common problem in collaborating companies is their failure to accommodate differing cultures. Therefore the corporate culture comes to be a controversial issue for companies that are going to set up a global service alliance (Grambs & Zerbib, 2000). Multi-cultural issues between collaborating organizations are a separate topic of discussion, and have been handled by Unhelkar (2003c).

Conclusion

This chapter has discussed in detail the impact of web services on cluster-based e-transformation. It was argued that since web services enable a group of

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organizations to e-transform simultaneously, it is essential to consider number of key factors that influence such collective transformation. While the way the business has used the Internet was shown, it was also shown that to make effective use of the Internet, businesses need to collaborate extensively with each other (this was shown at the tip of the Internet usage triangle in Figure 2). Since web services facilitate this interaction much more easily than a standard information and transactive use of the Internet, they form the backbone of cluster-based e-transformation. Furthermore advantages from deployment of web services-based applications is also possible when a group of organizations start dealing with each other electronically. As a result of these possibilities offered by web services, it is important to consider a shift in the way organizations e-transform. Subsequently instead of focusing on a strategy for a single business, a carefully thought-out approach is imperative to focus on a group, or "cluster," of businesses in their e-transformation endeavour. These key aspects of a business such as the customer, technologies, infrastructure, alliances with other businesses, software and e-business designs, conversion of data and programs, and managing the change were all considered in light of a cluster of organizations transforming simultaneously.

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Chapter X

Quantitative Modeling in Introducing and Managing New Information Technology in Global Business Operations

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Abstract

This chapter introduces the concept of using mathematical models to select international markets for global business operations. It uses predictive modeling of the Internet growth of many international countries as examples. The authors hope that it will help multinational enterprises and policy makers of any nation to study the importance of using quantitative planning models in introducing and managing new information technologies to new markets.

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Introduction

The use of the Internet and mobile information technology has become prevalent in today's world. The Web has reached all over the world. Mobile technologies are impacting the global business domain. This means new opportunities for communications among individuals, businesses, and nations. As a result, it is important for both private and public sectors and policy makers of any nation to study the growth of new, innovative information technologies from their inception to subsequent en masse use. Statistics are available about the growth of previous technological innovations. However quantitative models explaining the new technology growth in global business operation appear very infrequently in the literature.

The basic question here is how should businesses decide to enter new markets with new technology and manage the new information in the new market? The answer to this question can obviously be obtained in thorough study of many dimensions that impact the decision. For example, one factor could be the mathematical modeling involving market selection. Success or failure in the proper selection of target markets could lead to disastrous results in terms of growth of the company. Another factor could be to study the potential new markets (countries). Mathematical models can be developed to study the potential growth of the new technology based on many factors related to the new markets. Similarly one can think of many other factors that impact the success of the strategic decisions to select target markets based on research. Before the birth of computers, the decision maker (DM) had to depend on gathering knowledge about the new markets and drawing conclusions from the data based on mostly intuitions. With the advent of new technology we can introduce mathematical models that can help DM to make these basic strategic decisions. In the event of a bad decision, DM can go back and tweak the relevant model parameter and apply that new model for future enterprise.

It is beyond the scope of this chapter to focus on all the dimensions that are relevant to a successful strategic decision of finding the right target markets. Instead we focus on the introduction of mathematical models to study the potential markets for introducing the new technology. A solid understanding through mathematical modeling should lead to a successful decision. Also, just a successful introduction of a new technology is not good enough, because one has to maintain the leading edge during the product cycle that goes through internal as well as external competitions.

The objective of this chapter therefore is to discuss quantitative modeling to introduce and manage new information technology successfully in global business operations. We will use new information technologies data such as the *Internet* and *mobile technology* as examples.

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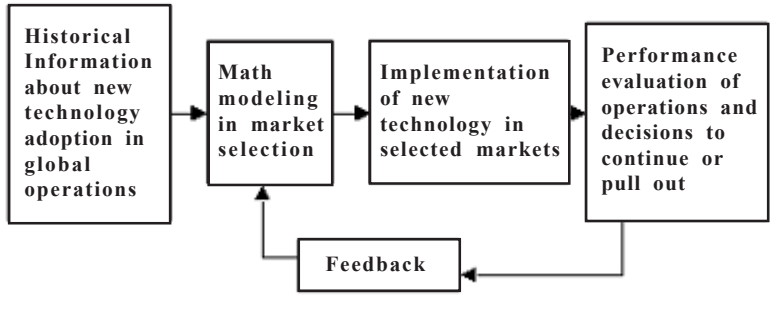
The remainder of the chapter is organized in the following way. In the background section we introduce the topic and incorporate views of other researchers. In the mathematical models and data section we introduce the mathematical models that involve conceptualization of the problem and its abstraction to a quantitative framework. The dependent and the independent variables are identified, and the mathematical relationships are established between them. In the next section we provide results, analysis, and recommendations. Finally in the last section we discuss conclusions and future research. We list a set of relevant references.

Background

In this section we discuss the business cycle shown in Figure 1 in introducing new information technology in global operations that involves quantitative modeling.

Before launching any business operation that involves information technology in a global market, historical information should be gathered about the status of information technology adoption in different countries all over the world. Once relevant information has been gathered about how in the past new technology grew over time, mathematical models can be set up to predict the potential market size of the proposed new technology in the new market. This is very important, because DM will decide whether to venture in a new market based on these models. Once DM selects new markets for the global business operations, the new technology is implemented. DM's job is not finished yet. Data is gathered to track down the success of implementation. If the market size is not big enough as predicted, the operation may have to be terminated. If the implementation is successful as planned, the process continues. The prediction error can be quantified and fed back to a math modeling group for future effort.

Figure 1. Quantitative modeling opportunities in global business operations


Historical Information about new technology adoption in global operations
Math modeling in market selection
Implementation of new technology in selected markets
Performance evaluation of operations and decisions to continue or pull out
Feedback

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The major benefit in introducing quantitative model in helping DM make decisions is to solidify the business decision-making process. Today's global operations are very complex and decision making based on sheer intuition without any quantification is risky. Quantifying the decision-making process not only helps DM pinpoint what went wrong if anything is wrong, it eases the decision-making process for any future enterprise through effective learning. If properly adopted, the performance of the global business system can be considerably enhanced.

In the next sections we will focus first on introducing mathematical models for this strategic decision making. We will emphasize the explanatory power of the models. We will use the Internet growth data for model results. Subsequently we will discuss the predictive power of the model by introducing a validation scheme. As shown in Figure 1, we will also discuss the feedback aspect from prediction error to mathematical model rebuild. As discussed in the previous sections, we start with the idea of modeling the spread of the Internet over many countries or potential markets. We start with the basic class of models that were developed over the last two decades. The purpose of this chapter is to build on those modeling schemes.

A review of literature on the Internet adoption suggests that many recent models were based on contagion effects from diffusion of innovation theories (Gurbaxani, 1990; Mahajan, Sharma, & Bettis, 1998; Press, 1990; Rogers, 1983). Diffusion models were tried in several fields, such as management, sociology, marketing, communication networks, and medicine, to model diffusion throughout a population of adopters (Rogers, 1983). The underlying assumption in those models was that the nonadopters (those who do not have the access to the Internet, in our case) are increasingly likely to imitate adopters over time. That means the Internet growth rate depends on the imitation behavior between adopters and nonadopters. Subsequent analyses (Rai, Ravichandran, & Samaddar, 1997) found that contagion effects alone might not completely explain the Internet growth. The study found that logistic and Gompertz models had less predictive validity compared to the exponential models. The logistic and Gompertz models are based on contagion, whereas the exponential model is not. However a study on the growth of e-commerce (Samaddar, Nargundkar, & Mukhopadhyay, 2002) suggests otherwise. They concluded that logistic model predicted better than the other two. In a different study Mahajan et al. (1998) also questioned the appropriateness of the imitation hypothesis for the adoption of the M-form structure among the U.S. firms. Results from another study on the diffusion of the M-form structure (Venkatraman, Loh, & Koh, 1994) could not substantiate the role of imitation. Therefore we conclude that contagion alone reflects an incomplete understanding of the mechanics of the Internet growth. A new direction is required in modeling the growth of Internet adoption. This chapter focuses on the global adoption instead of focusing on a few nations.

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IBRD/World Bank Group (2000) suggests that many factors such as spread of technology, literacy, and economic development of nations may be interrelated. Motivated by this observation that the Internet diffusion could be both a social and technological phenomenon, Dutta and Roy (2003) captured the relationship between Internet growth and many social and technical attributes in a cause-effect structure. They observed that their feed back causal model worked much better than the logistic and Gompertz models (Mahajan et al., 1998) on the data from two countries — India and the U.S. Instead we introduce a new approach here that starts with a simple baseline model with a few attributes. These attributes are chosen based on previous research. We then build the model based on explanatory power of the incoming attribute from a set of attributes. This approach has a solid foundation of basic statistical techniques. This not only helps explain any model that we build but also helps look for a model that generalizes over time. As a result we run our models on many countries instead of just one or two to report the generalization power of the model. We next discuss the development of theory in the adoption, which serve as the basis of the mathematical modeling.

Kwon and Zmud (1987) laid down an analytical framework to explain information technology (IT) adoption. However, in their work, national-level indicators were not mentioned. These indicators are needed to explain IT adoption in a multi-national adoption context. In a recent work (Bagchi, Cerveny, & Hart, 2001) it has been empirically shown that economic, social, cultural, and institutional indicators are needed to explain the adoption of IT in a multi-national situation.

A simple conceptual model of multi-national IT adoption involves three types of adoption indicators: economic, infrastructural, and educational. Hofstede (2001) mentions that simpler explanations should have priority over more complex ones. If "hard" variables such as economic (such as GDP per capita), technological (technology base), and so forth predict a country variable better, those make other variables redundant. We want to explore this basic model with some hard variables that are grounded in previous work and add on other indicators as needed.

Economic indicators such as GDP per capita are important in such adoption. It has been shown that economic indicators such as base GDP per capita are important in explaining economic growth of a nation (Barro, 1991). The better the economic health of a nation, the larger the prospect of the Internet adoption, as the economic power of individuals grow in such prospering economic environments. Internet use requires use of computers and telecommunication gadgets such as telephone or cell phones, mostly at home. GDP per capita is the standard measure of a country's economic development. Other economic indicators such as inflation rate, income inequality, and so forth could also be important

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determinants of adoptions of certain IT. Based on this we can build our first hypothesis:

Hypothesis H1: The Higher the GDP Per Capita, the Higher the Internet Adoption

Education could be another important indicator in Internet adoption. Primary and secondary education enrollments of a nation have been used as determinants of economic and IT growth (Bagchi et al., 2001; Barro, 1991). In most nations children go to school, although the number of schooling years could vary. In affluent nations years of schooling could be longer. For using the Internet efficiently, one needs education and training. In many nations emphasis on learning technologies is considered a good thing. Governments are wiring their educational institutions. The argument in favor of this is: If the nations have to remain competitive, students should learn to use the newest technologies such as the Internet. The more technology-trained a student is, the better the prospect of adopting and using the Internet in a given nation. So better education and training can improve the use of Internet. This "technological literacy" training is more likely to happen at secondary school level. So our second research hypothesis is:

Hypothesis H2: The Higher the Percentage of Secondary Education Enrollment of Nation, the Higher the Internet Adoption

Human societies and organizations use technology to defend against uncertainties, to gain competitive advantages to become more efficient. Technological Imperativeness theory implies that once underway, the technology's march is irreversible or unstoppable. Chandler (1996) cogently articulates:

Those who pursue certain problems primarily because they are 'technically sweet' are following the technological imperative. It implies a suspension of ethical judgment or social control: individuals and society are seen as serving the requirements of a technological system which shapes their purposes.

The evolution of the Internet appears very much in consonance with this theory. It simply means that mechanization has affected social organization and indi-

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vidual behavior in such a way as to create a foundation for further development along certain lines (Mowshowitz, 1976). Thus advances in telecommunications and PC revolution may have paved the way for the Internet. So we can describe the next research hypothesis as follows:

Hypothesis H3: The Higher the Level of IT Infrastructure, the Higher the Internet Adoption

Mathematical Models and Data

Before we describe the mathematical models, readers must be familiar with the data we have used to build the models. In the model validation section we describe the validation data set and discuss the importance of creating good validation data sets.

The data are obtained from the World Bank Database (*http://www.worldbank.org*, 2003). The GDP data is obtained from GDP per capita at PPP. The Internet data is the number of Internet users per 1,000, PC and telephone data are on PC and mainline telephone usage per 1,000, and the educational data is percentage of secondary enrollment in schools. The information technology variables are used as infrastructural variables. It is well-known that the PC and telephones serve as basic infrastructure of the Internet. The number of nations varied from 62 to 68 depending on availability of data. Nations with partly missing data had to be deleted from the dataset.

We consider two approaches to organize our data. First we look at model relationships between dependent and independent variables on cross-sectional data. We look at 1996 and 2000 data for 62 countries to test the three hypotheses described in the earlier section. After analyzing the model explanatory powers and significance levels, we expand the analysis on the time-series data. To analyze the predictive power of the models, we split the data sets in two while building the longitudinal models. Data for years from 1991 through 1999 are used for calibration while data for year 2000 are held for model validation. This way we could remove the bias from the model validation.

All the diffusion models are tried on longitudinal data for a group of nations categorized by the World Bank based on some criteria. For example, the Organization for Economic Cooperation and Development (OECD) set of 28 nations have a similar aim and objective: to achieve the highest sustainable economic growth and employment in member countries while maintaining financial stability, to contribute to sound economic expansion in member and non-member countries, and to contribute to the expansion of world trade

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(www.oecd.org). This example set of nations has been used in many economic studies as a benchmark example. Instead of building country-by-country models, models are more powerful if they work on a group of similar nations. We will report the results on the following nine groups of nations that represent more than 150 countries around the world: heavily indebted poor nations, high-income nations, high income: OECD, high income: non-OECD, least-developed countries, low and middle income, low income, lower-middle income, and middle income.

As we explained before, it is good to find out first if there is any functional relationship between the Internet use level, the attribute of our interest, and the selectively chosen socio-economic factors that impact the Internet use level. We look at the cross-sectional data for the years 1996 and 2000. We use the following cross sectional regression model:

Model 1: INTxx = f (GDPxx, TELxx, PCxx, EDUxx) (1)

INTxx is the Internet access per thousand, GDPxx is the base GDP per capita, TELxx is the number of telephones per 1,000, and EDUxx is the average secondary-level enrollment ratio in year xx in each candidate nation.

We discuss in detail the analysis performed on these results in the following section. After looking at the explanatory power the model, we expanded our research to diffusion models and other regression models on longitudinal data for normative as well as predictive analysis. For benchmarking purposes we start with a classical exponentially smoothed classical model instead of a naïve model:

Model 2: $INT_t = alpha*INT_{t-1} + (1-alpha)*F_{t-1}$ (2)

INT_t = Internet use at time period t for a country, F_{t-1} is forecast of it at time period t-1, and alpha is the smoothing constant. This is used as a base bench-marking model for time series data even though we know that this model will always try to catch up with the actual value of the Internet usage because of an upward trend in the data. Otherwise the bias of Model 2 will always be on one side. Clearly any good model should perform better from the base model. We propose next the very standard exponential model analyzed a lot since 1980 in the literatures:

$INT_t = A*e^{(t*B)}$ (non-linear functional relationship) (3)

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A and B are parameters to be estimated from the data and "e" is the natural logarithmic constant, approximately 2.71828. For B>0 the LHS is an ever-increasing growth that reaches infinity as time instance t approaches to infinity. By taking the natural logarithm of both LHS and RHS, the model is converted to a linear one:

Model 3: $\log(INT_t) = \log(A) + B*t = B0 + B1*t$ (4)

Next we consider a traditional pure contagion diffusion model. The Gompertz diffusion model is selected because of its ease of use in linear form. The model can also be easily extended, keeping the linear form with parameters obtained from adoption Model 1. The linear approximate form of Gompertz model is given below:

Model 4: $\log(INT_t) - \log(INT_{t-1}) = \alpha*(\log(INT^*)-\log(INT_{t-1}))$ (5)

INT* is the equilibrium point for the Internet use. We now discuss how to extend the Gompertz model with relevant indicators obtained from Model 1. If we assume that INT* is a function of certain variables (GDP per capita, education level per 1,000 population and IT infrastructure expressed in terms of PC and telephone adoption per 1000 population) affecting the equilibrium level, then:

$$\log(INT^*) = B0+B1*\log(GDP)+ B2*\log(EDU) + B3*\log(PC) + B4*\log(TEL) \quad (6)$$

We can substitute this expression of log(INT*) of equation (6) in equation (5) and after some simplification of the equation, we can derive the equation of Modified Gompertz (Chow, 1967):

Model 5: $\log(INT_t) = B0 + B1*\log(GDP) + B2*\log(EDU) + B3*\log(PC) + B4*\log(TEL) + B5*\log(INT_{t-1})$ (7)

B0, B1, B2, B3, B4, and B5 are parameters to be estimated. Also, as mentioned earlier, GDP, EDU, PC, and TEL are the values for GDP per capita, education level, number of PCs, and number of telephones in each country (per 1,000 population), respectively. Many models can be generated from the combinations of the attributes GDP, EDU, PC, and TEL from equation (7) to derive various

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versions of Model 4. The model-generating process adds one variable at a time to build a model. Based on the explanatory power of the current model the process keeps the existing variables in the model and adds a new one. After the addition of a new variable the process looks at all the variables and determines if all the existing variables in the model stay in the model before adding a new one based on the standard F statistic test of significance of the overall model , t-statistics of individual coefficients, and the expected sign of coefficients. The model that has the best fit (in terms of R^2) as well as all coefficients with relevant magnitude and sign is selected as the representative Model 4 of a given nation or groups of nations. In the following sections we will analyze the results obtained from Models 1 through 5.

Our data consist of the number of Internet users per 1,000 from a set of nations collected from the World Bank. In particular our analysis is based on various groups of nations, the details of which are given in Table 1.

Our education variable (EDU9899, or simply EDU) is the average percentage secondary education enrollment in years 1998 and 1999. Our IT infrastructural variables, PC1995 (in short, PC) and Tel995 (in short, TEL), denote PC and telephone adoptions per 1,000 in 1995. Finally GDP1996, or GDP, denotes the GDP per capita of a nation in 1996. The various country groups as classified by the World Bank and United Nations have markedly distinct income and indebtedness.

Table 1. The economic classification of nations

Economic Group of Nations	**No. of member nations**	**Average GNI per capita, PPP (current international $) in 2002**
Heavily indebted poor country	30	1240
High income	56	27590
High income: OECD	24	28180
High income: nonOECD	32	--
Least-developed country	49	1210
Low & middle income	21	3910
Low income	64	2040
Lower-middle income	54	5130
Middle income	45	5630

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The World Bank's main criterion for classifying economies is gross national product (GNP) per capita. These various nation groups would exhibit markedly different growth in Internet use and thus present contrasting scenarios in Internet growth study. Theses sets are overlapping and cover the entire set of nations. An outlook of Internet growth for these groups of nations is particularly significant. The world's poorest and most heavily indebted countries (HIPC) have three of four key ratios (averaged over 1999-2001) above critical levels: debt to GNI (50 percent); debt to exports (275 percent); debt service to exports (30 percent); and interest to exports (20 percent).

Results and Analyses

We start with Model 1. The aim is to identify relevant indicators of Internet adoption. Initially years 1996 and 2000 are selected for the empirical study concerning hypotheses 1 to 3 for 68 nations. The OLS regression results are shown in Table 2.

The Pearson's correlation coefficient values are first computed for the variables to find out if there is any real relationship between the factors and the internet adoption. As predicted all independent variables have significant correlation with the dependent variables. Data rows containing missing data are deleted using list-wise deletion scheme.

Except for the education variable, GDP and some infrastructural indicators are significant in both regressions. The variance of the dependent variable explained by the set of independent variables varied from 0.45 to 0.76. Table 2 shows the step-wise regression after controlling for Internet users in 1996. The results are somewhat identical: not only GDP and some infrastructural indicators were significant, the education variable also became significant. This shows that supports for hypotheses 1 and 3 are there. Support for hypothesis 2 is limited. The

Table 2. Model 1 OLS regression of Internet adoption, 1996 and 2000

1996: R^2=.45, N=62 nations, F=13.55 (p<.000), 2000: R^2=.76, N=68 nations, F=50.72 (p<.000)

45, N=62 nations, F=13.55 (p<.000), 2000: R^2=.76, N=68 nations, F=50.72 (p<.000)

	Standardized Coefficients	1996 t	1996 Sig.		2000 t	2000 Sig.
	Beta 1996			Beta 2000		.
(Constant)		-.705	.484		-1.818	.074
EDU9899	.118	.916	.363	.048	.290	.773
PC1995	.404	1.938	.058	.224	1.321	.090*
TEL1995	-.219	-.989	.327	.514	5.696	.000
GDP1996	.483	3.481	.001	.214	2.550	.013

α Dependent Variables: INT1996 and INT2000. *: 1-tailed t test

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results from Model 1 help us to identify the key variables (GDP per capita, PC per 1,000, Telephone per 1,000) related to adoption of the Internet over time. We also retained EDU as another key variable, as correlation results showed that EDU is strongly correlated with Internet adoption (in both 1996 and 2000). We are going to use these variables in constructing the modified Gompertz diffusion model (Model 4).

We now consider the Internet growth (time-series) data over the period 1991-1999. Models 2-5 will be applied and tested on this time-series data. We use here Model 2 as the benchmark model. This is a classical forecasting model used to predict time-series forecast. The model does not have any analytical explanatory power. However it has been used as a standard forecasting tool. For our purpose it will only serve as reference model for performance validation. We will also discuss this in the next section. However we want to point out a few things here about the model. When the time series data have a consistent upward trend, a regression analysis is better than an exponential model because the smoothing model will always try to catch up with the data. Usually a small value is chosen for the smoothing parameter alpha so that only a small amount of weight is given to what actually happened in the last period. However, in our case, it is not expected to work as there is a clear upward trend in the data. In the next section we will present our validation results by using two values of alpha (0.2 and 0.9). We do not expect 0.2 value of alpha to work well because this model will try to catch up slowly with the upward trend in data. However using alpha = 0.9 gives us a model that tries to catch up faster. This is also close to a model that is widely called a "naïve" model in predictive scenario because it essentially sets the forecast to the last data point. Naïve models are widely used as reference point for forecasting. Any good model should do better than the naïve model when validated in an unseen data set.

Our purpose here is to find the explanatory as well as predictive power of the quantitative models in gaining information about the market a company wants to penetrate. Our next model is the exponential model. We include this model as past research (Rai et al., 1997) has shown that the global Internet adoption is exponential in nature. However exponential models lack in analytical power — no innovation can go on increasing forever, which is the underlying assumption of the exponential model. Thus we do not expect much explanatory power from the exponential model (Model 3). It just uses preset functional relationships between the data. Even though the model should explain the variability in data (as we will see below), it is expected to fail when validated for predictive power. Model 4 is the "Gompertz" model that is widely used in diffusion research. Model 5 has the "cause and effect" structure embedded into it. Therefore, model 5 is different than the previous models. Model 5 is expected to do well in both explanatory and predictive stages because of its "cause and effect" relationships between dependent and independent variables.

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Table 3. Fit statistics of Model 3 (exponential)

Country	B0*	B1*	Adj-R^{2*}
Heavily indebted poor country	-10.068	1.146	0.952
High income	0.913	0.506	0.991
High income: OECD	0.952	0.502	0.990
High income: non-OECD	-6.934	0.174	0.997
Least-developed country	-11.863	1.276	0.991
Low & middle income	-4.763	0.780	0.989
Low income	-9.662	1.253	0.915
Lower-middle income	-4.756	0.779	0.989
Middle income	-4.116	0.763	0.990
* All p-value < .001			

Table 4. Fit statistics of Model 4 (Gompertz)

Country	B0*	B1*	Adj-R^{2*}
Heavily indebted poor country	--	--	
High Income	.485	.994	.983
High income: OECD**	.481	.995	.982
High income: non-OECD**	--	--	
Least-developed country	--	--	
Low & middle income	.711	.848	.992
Low income	.673	.841	.914
Lower-middle income	.745	.861	.978
Middle income	.784	.846	.989
* All p-value < .01; -- coefficients are not significant or inadequate data			

In Table 3, we report the Model 3 fit statistics for all countries in nine groups mentioned in the previous section. Clearly almost all the models have a good fit, with adjusted R-square value of more than 99 percent at a low p-value significance .001 or less.

Model 3 does not have the cause and effect structure. Even though the model fit is good, we believe this model is bound to fail in the long-term projection.

We next introduce a pure contagion-based diffusion model, the Gompertz model. Results are shown in Table 4.

The model obtained good fits with the last-period Internet use, with positive coefficient values for seven groups of countries. The adjusted R^2 values are all high at an acceptable significance level. However the main problem with this model is that even though it explains the variability in calibration data, it is a pure

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contagion model. As a result, it is not expected to do well in the long-term projection. We will also look later in the validation section at how this model has performed on the common validation sample that the other models are tested on.

Next we look at the Model 5 fit statistics. Model 5 has five independent variables. We used the stepwise regression method to look at the best combination variables based on a stepwise selection of variables, as discussed earlier. Each variable is added to the model one by one based on the F statistic value at an acceptable significance level. Variables may also be deleted from the model instance if it is not significant (F statistic) at the model instance. We give the Model 5 fit statistics in Table 5 for five groups of countries.

The attribute telephone (TEL) was not used in the model because telephone data were non-available for these groups of countries. The models shown in Table 5 have only one modifier variable (GDP, EDU, or PC). The model GDP-Gompertz, for example, denotes the modified Gompertz model with only GDP as the modifier variable.

If we look at the fit statistics from Table 5, we see that Model 5 had accepted GDP and EDU as modifiers. Education level and GDP are important variables in the final model instance. This confirms what we observed earlier in Internet adoption results. Some models were thrown out even though they had good adjusted R^2 values. However since this is a time series data, the fit statistics have to explain both the longitudinal and the cross-sectional activities. The adjusted R^2 values are very high, which means Model 5 explains the variability of the dependent variable more than Models 3 and 4.

Table 5. Fit statistics for Model 5 (Modified Gompertz) on groups of countries

Country	Intercept	$INT_{(t-1)}$	GDP-Gompertz	EDU-Gompertz	PC-Gompertz	Adj-R^2
High Income	-73.032	.532	7.496	--	--	.993
High Income: OECD	-77.996	.493	7.992	--	--	.993
Low & middle income	-10.486	.492	--	2.773	--	.999
Lower-middle income	-12.783	.373	--	3.099	--	.991
Middle income	-12.1143	.445	--	2.909	--	.998
* Almost all the statistics are significant at 0.1 levels; -- coefficients are not significant or the fit is not the best one						

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Model Validation

In our numerical example we used Internet usage data. Planning ahead is possible in any technology business if one can predict with a reasonable accuracy the Internet usage at least in the short-term. We therefore tried to do that by calibrating a few important models of the Internet usage. Most of the diffusion models were focused on the fitting of novel models on the past data and explaining them. A solid understanding of the Internet adoption models is required for a theoretical grounding in the field. Later Collopy, Adya, and Armstrong (1994) stated that utilization of the findings from the forecasting literature can be used to improved assessments of predictive validity of any such models in information systems research. They discussed three basic principles of good validation procedures: different data set for validation, well-accepted models for benchmarking, and adequate sample of forecasts. We discuss in the following section the importance of doing so.

If the model, after careful investigation, seems to be a good one that explains the past data very well, it is then expected to do well on the data set it has not seen (prediction). This process is usually called "generalization." However often a model with good fit statistics does not perform well on unseen data. There may be a few reasons why a model that seems to explain the calibration data very well does not have the predictive power. One reason may be that the data could just remember the sample point locations in the solution space during calibration and reduce the calibration error. However the location-specific memory fails when the locations of validation samples change considerably with respect to the training samples. This process is called "memorization." This can happen when there are more variables in the model than needed. That is why it is important to build a good model validation data set. Models that perform well on a good unbiased validation data set ensure that memorization did not happen during calibration. There are many ways a good validation set can be prepared. However we chose to do it in the simple way that always works. We built our models (2-4) on data from years 1991-1999. We held out the year 2000 data for validation. The only problem with that is we could not use year 2000 data in the calibration. However if we consider the importance of a true validation, this information loss during model building is well justified. We used Model 1 to make sure that the attributes we chose are meaningful in terms of explaining the Internet usage over many countries. Once it was established that they can reasonably explain the Internet usage for many countries, we focused on model types 2-4 to calibrate and validate.

The third element in model validation is about avoiding "training on the validation set." This happens when a researcher calibrates repeatedly on the training set to make sure that the tweaked model performs well on the test set. The researcher inadvertently brings information from the validation set to calibration

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data in this way. Unfortunately results reported on model performance in literature may often be tainted by this unique phenomenon. We made sure that this did not happen here.

We now give below the results from the validation of Models 2, 3, and 4. We start with Model 2, which is our benchmarking model. In Table 6 we report the validation statistics. The forecast and actual values for year 2000 for alpha=0.2 are reported in Table 6 along with the prediction performance statistic. As anticipated, an exponentially smoothed time-series forecast did not work here as there is an upward trend in Internet use over time for all countries. In other words the forecast of Internet usage will never catch up with the actual values. We used 0.2 for the value of the smoothing parameter. The following two test statistics measure the quality of prediction:

- MAPE = (1/n)*((|Forecast – Actual|) / actual)
- BIAS = (1/n)*((Forecast – Actual) / actual)

where n = number of groups the forecasts were made for. While BIAS gives the general direction of forecast (up or low), MAPE indicates how far off the predictions are from the actual. In Table 6 the MAPE and BIAS are reported in a cumulative way. The last-row MAPE and BIAS give the prediction quality over all the groups under study.As expected the MAPE is very high (80.5%). The bias is also negative as predicted. The obvious conclusion is that it is not a good model to be selected for this problem.

Table 6. Validation statistics for Model 2 (Alpha = 0.2)

Country	Actual Internet Use	Forecast	Error	BIAS	MAPE
Heavily indebted poor country	2.135	0.272	-1.863	-0.873	0.873
High income	337.895	88.889	-249.006	-0.805	0.805
High income: OECD	343.715	89.726	-253.989	-0.783	0.783
High income: non-OECD	242.126	73.230	-168.896	-0.762	0.762
Least-developed country	1.194	0.154	-1.040	-0.783	0.783
Low & middle income	15.245	2.716	-12.529	-0.790	0.790
Low income	4.046	0.670	-3.376	-0.796	0.796
Lower-middle income	19.673	2.966	-16.707	-0.803	0.803
Middle income	25.720	4.599	-21.121	-0.805	0.805

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Table 7. Validation statistics for Model 2 (Alpha = 0.9)

Country	Actual Internet Use	Forecast	Error	BIAS	MAPE
Heavily indebted poor country	2.135	0.860	-1.275	-0.597	0.597
High income	337.895	205.471	-132.424	-0.495	0.495
High income: OECD	343.715	206.256	-137.460	-0.463	0.463
High income: non-OECD	242.126	188.310	-53.816	-0.403	0.403
Least-developed country	1.194	0.523	-0.672	-0.435	0.435
Low & middle income	15.245	7.680	-7.564	-0.445	0.445
Low income	4.046	1.873	-2.173	-0.458	0.458
Lower-middle income	19.673	9.124	-10.549	-0.468	0.468
Middle income	25.720	13.068	-12.651	-0.471	0.471

We next consider the validation statistics of the "naïve" model (alpha = 0.9) that is used as the base reference model for prediction. It is expected to do better than the previous Model 2 (alpha = 0.2), since it dampens the weights coming from previous time-series data. This forgetfulness property works better in this particular situation. In Table 7 we give the model validation statistics.

The improvement is phenomenal. The MAPE has come down to only 47%, so we can set this model as our reference model. Any good model should better this prediction rate. We earlier gave the fit statistics for both Models 3 and 4. In Table 8 we report the validation statistics for model 3.

Table 8. Validation statistics for Model 3 (exponential)

Country	Actual Internet Use	Forecast	Error	BIAS	MAPE
Heavily indebted poor country	2.135	4.007	1.872	0.877	0.877
High income	337.895	391.888	53.993	0.518	0.518
High income: OECD	343.715	393.461	49.746	0.394	0.394
High income: non-OECD	0.005	0.006	0.000	0.320	0.320
Least-developed country	1.194	2.459	1.264	0.468	0.468
Low & middle income	15.245	20.921	5.676	0.452	0.452
Low income	4.046	17.652	13.606	0.868	0.868
Lower-middle income	19.673	20.806	1.133	0.766	0.766
Middle income	25.720	33.620	7.900	0.715	0.715

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Table 9. Validation statistics for Model 4 (Gompertz)

Country	Actual Internet Use	Forecast	Error	BIAS	MAPE
High income	337.895	336.147	-1.748	-0.005	0.005
High income: OECD	343.715	336.146	-7.569	0.008	0.011
Low & middle income	15.245	11.976	-3.269	0.077	0.084
Low income	4.046	3.474	-0.572	0.093	0.156
Lower-middle income	19.673	14.93	-4.743	0.123	0.248
Middle income	25.72	20.147	-5.573	0.138	0.345

The MAPE is very high for this model. Even though the model did very well during calibration, it did not do well at all in the test set. This is the classical case for prediction studies. Model 3 did worse than the reference model. One has to be cautious about not being carried away by the fit statistics at the calibration stage. On the other hand if a model is built based on a few meaningful factors, it is expected to do well on the unseen test data. We give the validation statistics for model 4 in Table 9.

From validation results in Table 9 we can see that the MAPE has come down to 34.5% even though on a slightly different number of groups. This is certainly an improvement over Models 2-4. We next look at the performance of Model 5. The validation statistics are given in Table 10.

From the validation statistics it is clear that Model 5 is performing well in calibration as well as in test set. The MAPE is very low (18.5%) compared to that of Models 2-4. It has also done much better than our reference model (exponential smoothing).

Table 10. Validation statistics for Model 5 (Modified Gompertz)

	Actual Internet Use	Forecast	Error	BIAS	MAPE
High income	337.895	458.684	120.79	0.357	0.357
High income: OECD	343.715	467.605	123.89	0.359	0.359
Low & middle income	15.245	15.986	0.741	0.256	0.256
Lower-middle income	19.673	18.374	-1.298	0.175	0.208
Middle income	25.72	27.145	-2.43	0.121	0.185

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Validation Feedback

Previously, in Figure 1, we showed that what we learn from the validation can be fed back to the quantitative modeling scheme. The general feedback scheme that works for any quantitative modeling should work here also. We give below the general scheme of feedback for continuously revising the current model:

Step 1. Learn from the validation and document the validation results

Step 2. Quantify the feedback amount

Step 3. Send the information (numerical as well as qualitative information) back to modeling unit through a typical automatic feedback loop periodically

Step 4. Incorporate this new knowledge into the current model

Step 5. Revalidate the adjusted model with new test data

Step 6. Implement the adjusted model if validation results are good. If not, then wait for the next periodic feedback and document the current feedback

We can use our example to explain the above steps. Before we start to venture into a foreign market, let us say we are exploring how many Internet users will be in that market in the next five years so that we can plan our entry. Let us say we already have a model (in this case Model 4). We implement the model in the first year. We observe that on the whole the model is forecasting upward (4.5%). At this stage we have finished step 1 and step 2. We then send that information back to the modeling unit (step 3). The modeling unit can then adjust the model by "m*bias" downward, where m is the momentum factor or adjustment factor having value between 0 and 1 (step 4). At this stage a new test data set has to be created through" bootstrapping" or "cross validation" (step 5). If we are satisfied, we would go ahead with the implementation of the new model (step 6). This has to be continuously monitored periodically unless the company decides to quit the market or ceases to operate there for some other reason. As a result the process will work better if automated.

If there are two current models and one of them is projecting upward and the other one is projecting downward, then the modeling unit can combine them together.

Conclusion

This chapter demonstrates how managers may select the best predictive and explanatory model of Internet use, using a step-by-step approach. To start with

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several standard diffusion and forecasting models are considered. The model selection process selects the best model, which has both predictive and explanatory powers. The modified Gompertz model (Model 5), as introduced in this paper, is better in terms of explanatory power as well as descriptive power.

Future work should be on validating these results on many more nations. Also, to test the generalization power of the models, they should be tested on more longitudinal data.

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Chapter XI

Comprehensive Impact of Mobile Technology on Business

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Abstract

In this chapter we explore the concept of enterprise, or organisational mobility. We examine how mobility in a business can provide a competitive advantage and enhanced sustainability. Potential industry applications for mobile technology are discussed. We delve further by exploring the growth areas of mobile technologies and outline key success factors for the stakeholders in the mobile technology arena. We assess the many opportunities mobile technology brings to various businesses. Furthermore the impacts of mobile technology on organisations and society are evaluated. We then conclude by outlining various competing mobile technologies available to the market both today and in the future.

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Introduction

The business need for mobility and real-time connectivity are terms that are being used frequently in the technology industry but often without compelling business applications or concise and agreed-upon definitions. While it is important to note that technology on its own is only a means to an end, the purpose, or business objective, to which the most suitable technology is required has to be developed.

Mobility can enhance productivity, as workers are not constrained to their desk in order to perform everyday business tasks — for example, employees can still work whilst waiting in meeting rooms for a meeting to start. Furthermore, it can also help organisations enhance competitive advantage by allowing the organisation to move toward the concept of real time enterprise (RTE) through real-time data input and quicker decision making regardless of location.

However, despite these benefits, mobility does have its disadvantages, namely blurring the divide between work and non-work life. This is especially evident in the Information Age.

Certain components of the value chain have leaped ahead of other aspects, prohibiting greater uptake of mobile technology. While mobile device manufacturers continue to produce devices at an alarming pace, uptake and adoption has slowed due to factors outside their control. Apart from commercial reasons such as cost, security fears (both real and unfounded) are inhibitors. There are also external factors that can inhibit the movement toward a truly mobile society. The limitations of carrier infrastructure and standardisation issues are just a few. Enablers to greater mobile uptake would be greater applications provided by a single device, with faster connectivity than the traditional GPRS technology.

The Internet has been a blessing in disguise to the apparent and recent surge in the mobile age. Mobile technologies leverage on the strengths of the Internet for services such as data communications and information services. Where will it lead to? What opportunities will it provide to businesses? How will mobile technology impact on daily life? These and other questions will be answered in this chapter.

Mobile Technology

Mobile technology has evolved from the early ’80s. It now includes wired LANs (local area networks), laptops providing a sense of mobility, and computing power in a handbag. In 2003 we saw more and more proliferation of wireless

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connectivity, and growing wireless hubs have brought with them multiple device manufacturers. Devices include laptops, phones, and PDAs (personal digital assistant), as well as those in the converged marketplace, that is, a PDA combined with a mobile phone. The predominance of higher transmission speeds will allow devices to be more useful in accessing the ever-growing applications.

The growth in devices, infrastructure, applications services, and consumer demand to be "always connected" will exponentially drive mobile technology needs.

Consumers will find greater availability to information, and opportunity to complete transactions such as purchasing goods and services within the mobile environment. This will become increasingly predominant and common over the next few years, before a slowing down or a catching up of one or more of the components of the value chain.

Some Industry Facts

Increased mobile technology and the desire for corporations and executives to be "always on" and "always connected" has led to some exciting industry developments; below are some extracts of these developments.

- Datamonitor (2003) claims that as "shipments of mobile hand-held devices will reach 300 million by 2006, the need for dedicated, specialised functions for business applications will increase for most corporations."
- Forrester (2001) claims between 2001 and 2003 corporations have become more mobile, with usage of certain corporate applications increasing up to 100%, with growth of 50% year-to-year.
- Kwikhand (2003), a Palm solutions provider, claims in its recent report entitled "Logistics & Materials Management," that, "To stay competitive, it is imperative that you drive down costs, accelerate productivity, and synchronise operations. The supply chain generates increasing 'data capture' requirements, across the corporation, instantly, and accurately. The corporation needs to be more mobile and aware."

Symbol, the largest worldwide scanning player with global sales of $1.5 billion in 2001, has generated sales of $600 million on scanning devices alone, of which mobile devices are only a small amount. Symbol has recently installed 600 mobile scanners in grocery stores in Europe, allowing customers to immediately scan and pay much faster while providing merchants immediate supply chain information. This application demonstrates benefits of immediacy, real time, and data quality integrity as benefits for corporations. This installation is just one of many

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reported globally that are being trialed and subsequently implemented. Symbol, a leader in scanning technology, has created market openings in many other industries such as law enforcement, health, and logistics.

- Forrester, in its report entitled "Doctors connect with Handhelds" (2001), claims the hand-held MD solutions will grow to $1.2 billion by 2006, with core applications of uplifting patient data and ordering prescriptions online in real time, reducing multiple handling and errors. Doctors claim, " we can reduce errors, and redundancies and communicate to staff better."
- eMarketer (2000) claims 23% of workers are now considered mobile and spending more then 20% of their working time outside of their offices. While the selling price of PDAs has thus far prohibited the diffusion of hand-helds, this will now change, with prices expected to fall down to $167 by 2004, making the devices more affordable to corporations and individuals. This has been proven partly by the number of PDA manufacturers entering the market, from Palm back in 1996 to Handspring, Sony, and Microsoft, who developed their own operating system in competition with Palm. Since the introduction of the PDA there are now 17 manufacturers operating on Palm, Microsoft, and the Symbian operating systems. The same eMarketer report claims approximately 1.3 million mobile bar code scanning PDA devices will be shipped in 2004.
- A company called Research in Motion (www.rim.com) has recently developed the Blackberry, a Personal Information Management (PIM) tool capturing the "always on" executive market. Blackberry has also been eyeing the mobile data capture market with great interest as an extension to its so far highly successful PIM market.

Mobility in Context of Organisations

Enterprise mobility is the ability to work anywhere, anytime — at home, on the road, even in the office building away from your desk. To stay competitive, enterprises are mobilizing their businesses and workforce.

There are three components of mobility:

1) Mobile devices, for example, handheld devices, or points of access
2) Technology standards for transmission of data and/or voice, for example, Bluetooth, GPRS
3) Service providers and applications developers

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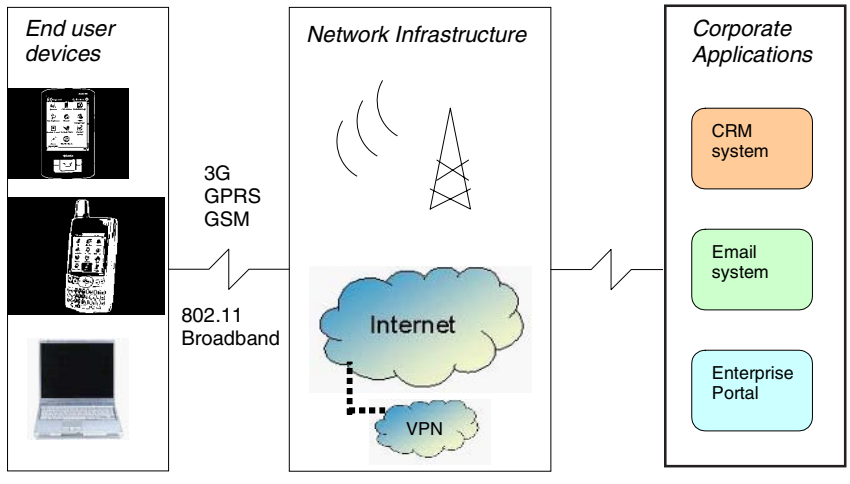
Figure 1. The end-to-end mobile story



This diagram depicts the relationship between the different components of mobility in an example of how mobile technology can be used in an organisation.

A leading research firm, Roper/NOP, published findings in April 2003 based on a unique global research study (RoperASW & NOP World, 2003). The findings from the project "Business-Critical PCs" indicate that when small and medium businesses (SMBs) deploy wireless applications in innovative ways, whether using tablets, Pocket PCs, or laptop PCs, they are able to reduce costs, provide their staff with more flexibility, and in many cases gain competitive advantage.

Organisations need to ensure that mobility solutions integrate into existing enterprise systems and are capable of extracting data from a wide variety of back-end systems, such as databases, content servers, e-mail systems, customer relationship management (CRM) applications, supply chain management (SCM) applications, and other enterprise software.

Industry Applications for Mobile Technology

Potential industry applications are varied and diverse; below is a list of potential mobile application for various industries:

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- **Medical records** management – That is, records could be travelling to various departments, and the scanner can be used to log the exact location of such records.
- **Highway patrol** for on-the-spot-fines – Licences and registration can be scanned immediately, with fines being logged at the central computer. This market needs to be developed further, and much background effort is required by the authorities.
- **Retail stores** – It is believed that in the U.S. Home Depot is using the mobile devices to track and order stock immediately. This is potentially a huge area of the market that is currently being, albeit partially, addressed by Symbol. Other U.S.-based retailers have also started to explore wireless technology for stocktaking and automated ordering of depleted stock.
- **Asset management** – Large corporations that own PCs and printers and so forth need to locate and audit their equipment. These devices are all bar coded; it would be easy and less time-consuming if the auditor simply scanned the bar code rather then having to manually write the serial number for data entry later. The new process would eliminate duplicate serial numbers or equipment that is misplaced, improving data quality.
- **Tracking** – This category has many growing applications for mobile technologies. Tracking of stock and inventory, for example, for chain of custody or for the tracking and entry of people at sporting events. Tickets can be issued with bar codes, allowing wardens and staff to monitor and police entry to various events, say, at tennis matches.
- **Ordering –** At restaurants and sporting events. Mobile solutions are being developed for the food and beverages industry, for example, by allowing people at various remote locations or at large sporting arenas to order their meals whilst seated. Each seat could be bar-coded, with an attendant simply taking the order, which is wirelessly transmitted to the central kitchen, prepared, and taken to the customer without the customer having to walk to a take-away station.
- **Home delivery** – A mobile device with the capability to capture data such as credit card or depot card information would potentially have a large market with, say, pizza delivery companies; in fact, Domino's Pizza is known to be trialing the concept.
- **Military applications** – The battlefield could benefit from the ordering of supplies and products in the field directly from the main store, as well as providing inventory management capabilities.
- **Manufacturing** – Chrysler in the U.S. has shown interest in using these devices for the tracking and ordering of stock. This provides various

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employees the ability to order on-the-spot components when required as well as update stock levels.

These are but some of the industries that are looking at mobile technology as a means to deliver better customer service and enhanced profits. The maturity of end user, and infrastructure in mobile technology, will see greater usage, providing the industry with greater revenue opportunities.

What predictions for mobile solutions?

Mobile technology will enable anytime, anywhere access and connectivity to information, and transactions, from ordering and automatically paying for pizzas to paying for a holiday apartment on the other side of the world to booking a flight with your favourite seat, on the fly, just before you get to the airport.

Businesses will be able to serve customers on site or from remote locations. Corporate staff will be able to access and perform business transaction such as interrogate customer relationship software while on the road, or simply to find a work colleague's contact details by connecting onto the corporate directory from the coffee shop. Placing customer requests from the retail location without having to return to the office will become more of a reality, hence increasing the "immediacy" of customer service. User interaction will be increasingly driven by speech recognition and could bring with it greater security.

What is the Growth Business for Mobile Technology?

Mobile technology will become more personalised. The device will no longer be just a mobile phone. It will now include a diary, an address book, a wallet (as seen by recent trial in Japan), and a mobile credit card. The technology will allow greater transmission speeds, lending it self to richer applications such as movies and live broadcast. Mobile technology will be ubiquitous to any specific device. Instead of asking for a Nokia or a Panasonic, consumers may be asking for a "communicator," similar to asking for a copier, rather then a Canon or a Hewlett Packard.

The competitive landscape is becoming customer-focused. Consequently, the customer base is becoming more demanding of the service it expects and receives. This leads organisations to deliver more service more efficiently, with greater levels of quality, possibly at a higher cost.

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More and more organisations are mobilising their resources to better deliver customer service. The core functions of mobility revolve around product ordering, data capture, data entry, and asset management as detailed below:

- Automated product ordering – based on data capture of stock numbers
- Field service ordering and data capture of product
- Sales force automation – product inquiry function
- Reporting – of asset management functions

The main value proposition that these core functions and values bring to mobile solutions is:

- Immediacy of action – data capture and information processing
- Data quality – due to "once-only" data entry
- Speed of service – via end-to-end automation rather then manual actions

The return on investment, or ROI (to be discussed in more detail later), starts to take effect once the above parameters are considered, particularly more for time-, quantity-, and quality-sensitive businesses. The benefits outweigh the cost of technology, cultural change, and training, as businesses become more responsive to customer need and customers in return reward through return business.

Hence the growth areas for mobile devices will be in the area of delivering better customer service and in innovative, and often unique, customer solutions that can be derived from these devices. Suppliers able to better meet the needs of customers around these core values will reap financial rewards in the mobile business.

Product differentiation is intrinsically linked to delivering innovative customer solutions. Consequently businesses will want to adapt new technologies in order to remain competitive and outgrow their competition.

What are the inhibitors to mobile technologies, and how will they be overcome?

Data transmission speeds will be the core inhibitor going forward for greater mobile usage, not applications. Mobile services will be limited by simply the type of application a consumer can possibly perform on a mobile device. For example,

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downloading a movie on a laptop provides a completely different experience than performing the same exercise on a mobile phone.

Cost of mobile transmission will also be a large inhibitor to the mainstream. While the early adopter and enthusiast will not be deterred by cost, the majority will exercise restraint based upon cost, until price reduction and levelling set in.

The usability aspects of mobile devices, or the lack thereof, will discourage mainstream uptake. However the onus to ease usability is not only on the mobile device designers but also on service providers who also have an equally important role to play.

Online services providers and their respective Web sites need to be re-designed for the smaller screens that are characteristic of mobile devices. It has been found that most are basically scaled-down versions of Web sites designed for PC users – that is, without the graphics and multiple columns. According to Nielsen (2003), to cater to mobile devices, Web sites and services should offer much shorter articles, dramatically simplified navigation, and highly selective features.

The message is clear for service providers — tailor online services and their presentation to the device or risk being left behind by the discriminating consumer.

Organisations currently face the issue of the trade-off between cost of supporting workers using mobile devices and the increased benefits gained through improved productivity. The total cost of ownership increases as mobile workers support their devices on an ad-hoc basis.

A way forward is to implement a centralized management solution. This means that support staff is able to deploy, configure, monitor, and troubleshoot the mobile device systems and applications from a central console manager.

Another key issue to consider is compatibility between different mobile devices. There is a variety of software available on the market, produced by different vendors, for different mobile devices. For example, Hewlett Packard's PDA uses Microsoft Windows CE operating system (OS), while Palm's PDA uses its own proprietary operating system Palm OS. Consumers are faced with many choices. The challenge is to ensure that different peripherals, file formats, and applications are compatible between different vendor's products as well as within a single vendor's product range.

When will "value-added" mobile technology become mainstream, as distinguished from voice mobile technology?

The notion of "immediacy" of information and transactions will drive the growth of mobile technologies. Mainstream adoption will surge once device prices

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reduce, similar to what happened with mobile phones, or be offered in different cost models for the consumer. The complexity of user functions needs to be made simpler, and there must be value in the information being accessed, and it must be worth paying for. In addition greater services proliferation will enable mainstream adoption, increase supply and influence cost. This argument is a contradiction in terms; greater functionality (which is a function of the technology) needs to be simple and intuitive.

Organisations' attitude toward adopting value-added mobile technology would be dependent upon several factors:

- **Speed of delivery of services for mobile devices** — Today's consumers understand that time equates to money. It is therefore imperative that services are delivered speedily with minimal delays.
- **Ease of use** — The workforce in organisations generally consists of users with different skill sets based on technology adoption curve. To ensure adoption of the technology, mobility solutions should be easy to use, requiring minimal effort by the consumer.
- **Reliability of service** — As workers have the ability to be always connected, they assume that the network will be available when demanded. Service providers must minimise network dropouts and implement policies to safeguard against any interference
- **Accuracy of transactions** — Service and application providers need to ensure that the integrity of transactions is maintained. For instance, if you asked for specific information, you are delivered that specific information. Or when you send information to a remote server, that information will not be altered during transmission.

Key Factors for Service Providers with Mobile Applications

While mobile applications and services offer enormous opportunities both to end customers and service providers alike, mobility brings with it many challenges. These challenges rest in the devices, carrier capability, infrastructure, and the application service provision.

The following text details the complexity of the wireless end-to-end solution. We can simplify the architecture around three main areas, the device, carrier capability, and application.

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Below is an analysis of these challenges and factors that will affect take-up of mobile applications.

Mobile Device End:

- **Length of battery life** – Mobile applications rely heavily on the capacity of the battery. Frequent charging deters users from using the technology. On the other hand, a longer life often implies a larger battery, implying a heavier and larger-sized device, which may inhibit take-up. As battery technology improves, devices will become smaller and more versatile.
- **Size of display area** – The size of the display on a phone, a PDA, or a smart phone is limiting for many applications such as watching a movie. However, a small screen size would be ideal for stock quotes and purchases or ordering commodity items.
- **Mechanism for data input** – Performing data entry onto a small handset would severely limit the mobile device usefulness for organizations that require large amounts of data entry. Automated bar code reading or Radio Frequency Identification Tags (RFID – an emerging technology) would provide fast and efficient data capture, reducing the need to manually enter the data and hence improving useability.
- **Overall form factor** – The form factor is the actual size, look, and usability of the device. Form factor used to describe the usability ("feel-ability") of the device measures how well the device performs the functions that it has been designed for, how well it does data entry, and how well it does data extraction work. All these issues are vital to ensuring the best device, with the best form factor, is chosen for the type of work being performed; that is, "fit for purpose."
- **Loss of device leading to loss of vital information** – Recently a device was stolen in the U.S., resulting in vital information of a financial organisation being lost to the underground market. This begs the question of whether the device should be an intelligent one or not – enabled to protect the data it holds through encryption. Should auto-synchronisation be a mandatory feature, although it would place demands for additional telecommunications and increasing costs? Should devices utilise their hard drives to allow for better availability, in case wireless connectivity is unavailable? Loss of mobile service should not prohibit a business from functioning, and while business operations would be best served in some cases with wireless connectivity, working offline (without connectivity to the network) should not stop an organisation from performing limited business functions. These

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questions must be answered, particularly where data quality, integrity, and immediacy of information is concerned.

- **Processing power** – Devices are becoming faster and smaller, though no sooner have the devices become faster and smaller than the application has become obsolete. This has lent itself to greater applications being available to consumers and will continue to increase with more players entering the mobile market, as profit potential materializes.
- **Cost of procurement** – Mobile devices, be it a PDA or a converged device (voice and data), are still in the early adopter phase, with manufacturers developing many varied devices, searching for an application that will capture the market. A converged device is one where the voice and data functionality are physically combined. It is early for these devices but the proposition to replace with a single voice and data end-user devices is high. Unlike mobile phones, these devices may take a while, say another one to two years before the majority takes up this technology. The cost will not reduce until there is a larger adoption, which will create a gradual reduction in price.

Carrier End:

- **Types of wireless technology** – Over the next two to three years, the maturity of the technology will determine which is predominant. As noted earlier, a variety of mobile technologies are available from the carriers. Which is most suited to the particular application needs to be assessed to ensure adequacy of speed. Costs will continue to play their role in consumer take up.
- **Security factors** – While mobile phones have "crossed the chasm" as far as security fears are concerned, transferring data, making stock purchases, merchandising purchases, and performing corporate data transactions stills remains the domain of the "technology enthusiast." Security fears seem to be less of a concern, industry pundits talk about the general adoption of wireless devices, and limited trials currently underway are developing greater confidence in the business community and amongst users.

Application End:

- Third-party application availability – The richness of the applications and functionality will also impact the user uptake.

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Key Success Factors for Mobile Industry Players

The following are excerpts from leading industry product and service providers addressing the need to assess and understand factors prior to penetrating the emerging mobile market. A short explanation is provided for each aspect covered below.

- **Targeting demographics for particular devices** – That is, wireless tablet PCs would be best suited in, say, an office environment, while a PDA would be best suited to personal use where carrying a large device is prohibitive. A wireless tablet is essentially a laptop-style computer with the capability to perform hand and speech recognition. Hand recognition is provided by simply using the touch screen to write on, as if it were a paper notepad, allowing greater flexibility. Tablet PCs are smaller and lightweight; most manufacturers now have a form of tablet PCs in the market as part of their emerging range of computer products.
- **Development of modular architecture and devices** – "Any device, to any application", a plug-and-play architecture, will be key to mobile technology uptake. Common industry standards will be vital to mobile technology adoption.
- **Developing relationships with service providers and systems integrators** – Industry players will need to work together, to enhance each other's capabilities. Working with others in the value chain to develop functionality would provide greater uptake of mobile applications.
- **Investigate advertising & corporate sponsorships opportunities** — Need to take advantage of various players operating in the mobile space working cooperatively to exploit market opportunities, not only for economic reasons but also for cross sell opportunities.
- **Producing small footprint applications devices** – That is, niche functionalities to cater to specific needs of various market segments. Manufacturers will need to investigate and fully understand market segmentation before investing large amounts of capital. A single standard mobile device may not suit all applications or business services, and hence compatibility and understanding business needs will be key.
- **Continue to develop next generation application** – Innovation is the key to sustainability. Manufacturers who continue to test and trial will eventually dominate the market. Continuous improvements to form factors and applications will reap technology providers with increased consumer uptake, market share, and profitability.

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- **Cost of end-to-end solution** – Solutions need to be affordable and effective. Cost of telecommunications needs to be reduced for data transmission, as already evident in voice transmission.

What will kill the potential "killer application?"

Mobile technology proliferation should learn from its voice predecessor. More compelling cost models and plans, suited to consumer lifestyles, will foster growth in demand. Poor data speeds and breaks between connections while moving (from mobile access point to another) will hinder the market. A non-ubiquitous network infrastructure, that is, one in which carriers do not cover a live session from each other's customers, will slow down adoption. An ubiquitous network could potentially allow any device from any carrier to be connected seamlessly, providing roaming from one carrier jurisdiction to another without loss of connectivity.

Other factors that will inhibit adoption:

- **Poor data transmission speeds** – Particularly for high imagery and interactive applications. Basic applications with limited graphics and written around simple text-based informational business functionality will develop the initial market. This will create market appetite and develop experience amongst the user community for these devices.
- **Cost of devices** – High end, for at least the foreseeable future, will prohibit mass uptake of usage amongst non-business markets. The business market will have more compelling reasons to adopt mobile technology. There will be some challenges faced by businesses to justify these costs, as seen by some organisations that wish to deploy PIM solutions via mobile PDAs.
- **Security of personal information-based applications** – For example, banking and other financial transactions. While the finance community have been looking for that elusive application that propels mobility, consumers are still, and will continue to be, reluctant to use mobile technology particularly for personal financial transactions. Informational interaction could be the driver for more meaningful uptake in the finance industry.
- **Loss of device** – Losing the mobile device can be considered a serious factor to faster mobile uptake. A mobile device can be a PDA, a smart phone, or a laptop/tablet PC. This can be considered similar to losing a mobile phone; however the above devices are still not mainstream and cost considerably more than a mobile phone, and, more importantly, contain valuable information that, if lost, could cause considerable financial harm or embarrassment to any organisation.

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- And finally, a **lack of a simple set of valuable reasons for businesses to use mobile devices** – However this is unlikely as all the evidence suggests otherwise; applications are plentiful. It will nevertheless be imperative for businesses to ensure the application has specific business value, addressing propositions and real business needs. Wireless services will not be adopted simply because of "cool technology" reasons, or at least not by the masses. Compelling business value must be the core objective. Speed of customer service, data quality, time and cost savings, and innovative customer solutions will foster greater wireless uptake.

Social Implications of Mobile Technology

The ability to always "be connected" has many implications on societal values.

Organisations will be able to implement "work from home" programs helping employees optimise flexibility and, as a result, achieve an improved quality of life. The opportunity exists to place a greater emphasis on family society and see a shift in family values as employees find a suitable work-life balance, all the while maintaining or even improving productivity. Furthermore the widespread adoption of flexi-work programs could help reduce traffic congestion, air pollution, accidents, injuries, or deaths associated with commuting to work.

However mobile technology also has negative impacts on society by blurring the divide between work life and social life. The demise of standard working hours for full-time work is already evident in today's society — especially at the highly skilled spectrum of the job market. Furthermore employees are finding an increased need to be multi-skilled in the usage of technology, and there is a requirement to work longer hours in order for the organisation to stay competitive. It is no surprise that children of the Information Age see less of their working parents.

In an article by Shipley (2003), she acknowledges that it is not only the mobile device or the network that is "always on." Sometimes it is the employees who can never switch off and tune out of work. Whether habitual or not, this has the potential to increase stress for employees. This extra stress can have measurably adverse effects on our health, from insufficient sleep to chronic stress fatigue and even increased blood pressure.

Not only must society find a common ground for the definition of work-life balance, individuals, too, have to define the right mix of work and non-work life, bearing in mind that every individual has a different outcome. Individuals need to define their own priorities – the priorities of their careers, of their families, the time for themselves, and the time for others.

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Organisational and Workforce Implications of Mobile Technology

There are three main areas that organisations will need to address when evaluating mobile technology's impact on the workforce:

- Cultural changes in the workforce,
- Segmentation of workers into different worker types,
- Occupational health and safety (OHS) issues surrounding the use of mobile technologies.

Enterprise mobility involves a cultural change in the workforce of an organisation. Adapting employees' attitudes toward working in new environments and working in ad-hoc manners requires change management strategies. Organisations need to assess how to train employees to use different types of technologies and how to design a best-fit training program. Organisations need to ensure that employees are able to knowledgeably retrieve, manage, and act upon information in a more flexible and efficient way, such that newer and more efficient business processes can be created, bringing increased levels of productivity.

As organisations move forward and embrace the concept of a truly mobile workforce, they need to understand the needs of their employees. These needs will vary, depending on factors such as role, location, network access, and types of information or applications required. Gartner (2003a) has classified mobile workers into five categories (see Table 1).

These categories all exhibit common patterns of mobility but distinct needs for information, devices, networking costings, support issues, and work patterns. Furthermore Gartner believes that by segmenting users into worker types, organisations are able to create strategies around these groups, thereby creating effective solutions for the use of mobile technology.

Occupational health and safety (OHS) is one of the crucial objectives of training, in particular educating employees on the correct posture to adopt when using mobile devices and to conduct their own workplace assessment, whether at home or in the office. Research has shown that prolonged use of laptops while travelling on the road hinders blood circulation in the abdominal area and increases the likelihood of "economy class syndrome." It may also lead to chronic back problems and bad posture habits. Furthermore, poor lighting increases the risk of eyestrain.

All these health issues arise due to the extra mobility, allowing employees to work anywhere, especially in places that were not designed for working long periods.

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Table 1. Categories of mobile workers

Worker categories	Requirements and characteristics
Alerts workers	Require small amounts of data in short bursts, and one or two button responses. These workers generally use thin clients as their work tools. For example, service notifications via SMS used by field staff.
Message workers	Require high mobility, as these workers are e-mail-centric whether on-site or off-site at customer locations. For example, sales managers need to touch base with their team constantly, employing devices such as a Blackberry to access their email.
Forms workers	Require high degree of connectivity and clipboard or form replacement applications. Work tools can be either thin or thick clients. For example, geomatic engineers, medical staff.
Knowledge workers	Require heavier forms and generally have broader needs than form workers. For example, detailed blueprints and images sent by construction managers to construction workers.
Power workers	Require mobility and almost desktop-like performance in order to access e-mail, but using thick clients. For example, executives.

ROI for Businesses to Provide Mobile Transactions and ROI for Customers' Uptake of Mobile Solutions

Consumers are looking for access to information and transaction capability. Businesses are only willing to provide mobile services if the value proposition is compelling enough — that is, there are significant and quantifiable financial improvements associated with the technology adoption.

Return on investments, or ROI models, will be driven by reduced infrastructure costs, both from carriers and applications providers. To date mobile services have been restricted due to these two core reasons. Overcoming consumer resistance to timed mobile "information calls" would encourage greater uptake and hence impact positively the ROI model of the service provider.

A report by Sage Research Inc. for Cisco Systems (*http://www.cisco.com*), prepared in 2001 and entitled "Wireless LANs: Improving Productivity and Quality of Life," outlined productivity benefits around three main areas:

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- Time savings
- Flexibility
- Quality of work

Time-Based Savings: The Sage Research report claims "a wireless LAN use can save up to eight hours per week versus a wired LAN use." Time savings often result in dollar savings, although how you measure these dollar savings can open a great debate. If these savings do not equate to revenue generation, their value can often be diluted. The time savings also have different values depending on the type of organisation and function an employee performs. Time-based savings with higher-paid employees potentially bring more value to the organisation being armed with mobile capability than does a lower-paid employee base. Time-based cost savings can be substantiated by idle time being better utilised by company executives; for example, a wireless device can provide connectivity while waiting at the airport or while in a cab.

On the other hand, service-based businesses such as tradespeople would benefit from "immediacy of action" by entering job data while on site, receiving payments while at the customers' premises rather than waiting for more traditional paper-based transactions.

Flexibility: Mobility brings the opportunity to, for example, remove your cabled tablet PC and seamlessly connect to the wireless connectivity, whether an employee is in the office, conference room, inventory area, training room, or even the café on ground floor. Apart from within the building, CDMA and other technologies will provide greater mobile range. A sales force can be connected via wireless connectivity while serving a customer many miles from base, hence eradicating the need to return to base to serve customer requests.

Quality of work: Sage Research claims "data can be fed directly from various locations instead of being manually entered at a later date." This improves data quality, reduced entry error and leads to potential cost savings.

Competing Technology Standards that Enable Mobility

Below we look at the various mobile technologies either in use now or slowly gaining momentum in the marketplace.

Wireless Local Area Network (WLAN) Technologies

Note that the transmission range figures (Deutsche Bank, 2003) provided for the IEEE (Institute of Electrical and Electronics Engineers) standards are a general

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guide only. In reality, it will depend on the mobile devices' antenna gain, the transmit power applied to the antenna, the reception sensitivity of the radio card, and the obstacles between end points.

- IEEE 802.11a

Frequency band: 5 Ghz

Transmission range: 50 ft

Transfer rate: 54 – 100 Mbps

Advantages: Higher transmission rates than other 802.11 standards. This would be an optimal choice for dense networks with bandwidth-intensive applications. The frequency band is not crowded, so there is less interference than in the 2.4 GHz band.

Disadvantages: 802.11a is not as popular as 802.11b. Currently this standard appeals only to niche markets. There is no backward compatibility with other IEEE standards. High capital cost to set up.

- IEEE 802.11b

Frequency band: 2.4 Ghz

Transmission range: 300 ft

Transfer rate: 11 Mbps

Advantages: This is the lowest-cost solution for small wireless networks. Decreasing chipset prices and increased volume of production will lead to notebooks embedded with chipsets. This is the most mature of the IEEE standards.

Disadvantages: Complex technology causes implementation issues such as security. Lack of support for quality of service, and the new 802.11g has been approved by the IEEE standards committee (12 June 2003) and may shift worldwide acceptance.

- IEEE 802.11g

Frequency band: 2.4 Ghz

Transmission range: 150 ft

Transfer rate: 36 – 54 Mbps

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Advantages: This standard allows for more demanding applications like wireless multimedia video transmission. This has a higher transmission speed than 802.11b. Provides interoperability as 802.11b and 802.11g devices can coexist in the same network.

Disadvantages: Total available bandwidth remains the same as 802.11b as restricted to three channels in 2.4 Ghz (this frequency band is getting crowded).

- IEEE 802.11i

This standard is currently under development by the IEEE 802.11 Task Group I. The driving objective behind this standard is to improve the standard and close gaps in current 802.11 WLAN IEEE standards. 802.11i provides a new authentication framework that encompasses several components to address and enhance the current security controls, including the integration of 802.1x (security for wired and wireless Extensible Authentication Protocol authentication).

An interim draft of IEEE 802.11i is now being circulated within the IEEE community, known as Wi-Fi Protected Access (WPA).

Wireless Personal Area Network (WPAN) Technologies

- *Bluetooth*

Frequency band: 2.4 Ghz

Transmission range: 10 m

Transfer rate: 1 Mbps

Advantages: The Bluetooth standard allows communication between mobile devices such as mobile phone and notebooks and peripherals. Users can communicate with another Bluetooth device without the need to configure the hardware or drivers.

Disadvantages: Short-range transmissions range. Despite tremendous momentum Bluetooth has not been adopted widely due to ease-of-use and interoperability issues.

Wireless Wide Area Network (WWAN) Technologies

- GPRS over GSM

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Frequency band: Uses GSM's 900 MHz, 1800 MHz or 1900 MHz

Transmission range: Global

Transfer rate: Up to 170 kbps

Advantages: This standard allows for remote communication involving data. For example, PDAs or phones can be used to browse the Internet or e-mail on the road. Users are always connected and can send and receive data without the cost and delay of making a call each time. Users are charged by volume of data. Take-up of GPRS services has been slow in the consumer market but is steadily growing in the business market.

Disadvantages: Transfer rate usually slower as you share with other users within the range of the mobile transmitter.

- 3G

3G wireless systems largely revolve around two ITU (International Telecommunication Union)-approved standards, CDMA2000 and W-CDMA (Wideband CDMA), both of which are developments of CDMA (Code Division Multiple Access). The current dominant markets for 3G are in North America, South America, and parts of Asia-Pacific (South Korea and Japan) only.

Japanese giant NTT DoCoMo's brand name for 3G W-CDMA services is FOMA (Freedom of Mobile Multimedia Access). In Europe 3G W-CDMA networks are known as UMTS (Universal Mobile Telephony System). In America the favoured technology is CDMA2000.

TD-SCDMA (Time Division Synchronous CDMA) is an upcoming wireless WAN broadband service that has recently attracted significant interest in China as an alternative to W-CDMA and CDMA2000. Universities in China, as well as research organizations, provided major contributions toward the development of TD-SCDMA. This is a major step in helping to bring China into the league of countries defining the future wireless industry, giving a boost to the Chinese wireless industry.

Transmission range: Within 3G network coverage areas.

Transfer rate: Ranges from 144 kbps in rural wide areas to 2.4 Mbps in stationary urban areas

Advantages: 3G allows for high-speed transmission of data and voice both for personal and business applications. Furthermore it supports enhanced multimedia, e-mailing, fax, videoconferencing, and Web browsing. The standard works by allowing multiple users to share radio frequencies at the same time without interfering with each other.

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Disadvantages: There is currently uncertainty surrounding the 3G mobile services market as it is considered high risk with dubious returns. For example, in Hong Kong, Hutchison and CSL have taken opposite strategies in their 3G roll out, with the latter taking a "wedding cake approach," according to CSL Chief Executive Hubert Ng (Australian IT, 2003). The competing 3G standard W-CDMA has not found commercial application and has encountered numerous issues, such as expensive auctions for the use of new frequency spectrum, as well as difficult development of handset products. 3G poses significant challenges for call "hand-over" from 3G to 2G networks with factors such as different network configurations, vendor equipment, and even operating conditions making the task difficult. The signals are more prone to interference from hills, buildings, and other tall structures.

Today's market is still in the 2.5G arena, a "light" form of 3G. SMS is a big success factor for 2G and 2.5G, and the MMS market (offered through 2.5G) is following suit as evident with the growing number of photos sent from mobiles. However despite the slow uptake of 3G mobile devices today due to factors such as lack of a mobile handset or high rollout costs, we believe that the dominant uptake of 3G will lead to the phasing out of 2.5G in the upcoming years. Service providers and carriers need to find applications at the right price point that will attract consumers and therefore generate a return on their investment in 3G. The evolution of 2.5G to 3G and beyond into 4G is inevitable.

- WiFi with Wireless Broadband Services

Broadband wireless technology players and network infrastructure providers are seeking to take advantage of the growth and usage of WiFi. According to Gartner (2003b) they are looking at ways to integrate the WAN solutions with WiFi either as a complementary solution or as a backhaul of WiFi.

With the number of hotspots increasing globally, users can leverage the strengths of both technologies. For instance, 3G together with WiFi can ensure a user who is connected in a building can seamlessly roam onto a 3G network when he or she leaves the building and walks out to the street. Wide-area broadband wireless service providers are able to offer flexibility and convenience of access that WiFi technologies are lacking in.

The latter solution involves the use of broadband services as a backhaul for WiFi or PAN. The backhaul could be at a fixed location such as at a hotel or in a moving location such as on a train. According to Gartner the advantage of using this mobile solution is that a WiFi device is much more universal and less expensive than a wide-area device.

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- Fixed Broadband

Broadband allows for high-speed data transfer, providing fast-speed Internet access with high levels of interactivity, facilitating services such as digital video on demand, simultaneous phone and data, and a range of applications and content that can reduce the cost of performing or delivering business services.

Broadband technologies provide organisations the link between their corporate network and the other networks such as the Internet and those of their trading partners. Broadband technologies enable the employee to access their corporate network and perform work tasks from their own home.

Consumers also use broadband technologies such as ADSL, cable or broadband satellite as a mode of accessing the Internet from their homes.

The increasing take up of Digital Subscriber Lines (DSL) technology in Australia has contributed to the number of broadband connections reaching 500,000 and more than doubling from June last year.

Recommendations

Mobile technology, like most, will take time to become mainstream; however, as people have become accustomed to mobile phones, the new wave of wireless mobility will see a faster adoption of data- and voice-converged devices as users become more familiar with the technology and its potential uses. To this end the following recommendations are worth considering:

1. Devices will need to be made simple to use but highly interactive.
2. Fast and efficient logging on to the telecommunications services provider will be key to fast uptake. Delays in dial-up or access based around high security will hinder uptake.
3. Eloquent form factors, appealing and lifestyle-based products will be more successful. For example, Nokia has been the leader in mobile telephony products.
4. Applications that have purpose, that is, provide a real-time service and enhance knowledge will fast-track mobility uptake. Consumers will be more compelled to endure early adoption issues if there is value.
5. Process and time savings will increase mobility uptake. Organisations will constantly look for opportunities to reduce times to serve customers. On the way look for reduction of paper, hence improving the bottom line.

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6. Regular new and innovative products and services will continue to drive innovative applications. Organisations will constantly challenge the usage patterns of products. Device manufacturers and service providers will need to be ahead of the industry demands to ensure customer demand for mobility does not wane.

In general wireless technology is just about to take off. As more and more organisations are taking the plunge to "try it out," some will benefit, some will not. If the above points are considered, many will come out singing the praise of wireless technology, but more importantly, their bottom line.

Summary

Mobile technology will offer enormous opportunity for players up and down the value chain, from the device suppliers to carriers to the end user. The Internet has entered the second phase, the mobile phase bringing with it a mature Internet platform and one where business models are based on customer value propositions and sound return on investments.

Amazingly different types of end-user devices are being developed and providing users with an array of choices. Some time during the maturity of mobile data devices, a set of particular characteristics will develop, forcing out many wild-end user device designs. Much potential exists for the end-user device manufacturer and application service provider who can develop characteristics and uses for mobile data devices.

As part of the evolution process, the technologies that fail to succeed and gain mass-market adoption due to lack of demand or other reasons will vanish from the market.

In this chapter we have covered many aspects of mobile technology with businesses. The core issues have been highlighted, from business applications, issues facing organisations, and benefits. Technology also plays a large role in the overall uptake, and this has been covered in this chapter with a view to highlighting the various types of technologies currently being developed by companies.

Over the next few years there will be winners, and some losers, a consolidation of manufacturers and service providers, a wide array of end-user devices and applications will continue to drive the organisation's need to explore new and innovative ways of serving their customers better. Innovative customer solutions and innovative organisations will continue to drive the market and set the pace of mobile and wireless technology adoption.

The only question is, will growing health concerns curb the enthusiasm?

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Chapter XII

E-Business in the Global Automotive Industry:
Key Value Propositions

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Abstract

This chapter reviews the components of e-business from a procurement perspective in order to explore the key value propositions of e-business practices in the global automotive industry. It is easy to simply state that a product or service "adds value" to a firm's operations. It is critical that the value proposition of e-business be analyzed from a rational perspective by any organization competing in the "post-irrational exuberance" era of the digital economy. Using an exploratory case study of the automotive

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industry, the key questions for identifying a true value proposition of e-business are identified, including their e-procurement, e-catalog order processing, e-auction and e-capacity systems. We intend this chapter to be helpful to practitioners, researchers, and students who either are contemplating updating their legacy e-business systems and/or trying to gain insight into the value proposition of these systems. It is undisputed that e-business will bring at least some level of benefit to a vast majority of organizations, regardless of size or industry. We intend this chapter to be valuable for evaluating and implementing a successful e-business strategy, structure, and solution.

Overview of E-Business

Components of E-Business

E-business is the integration by an organization of business processes and e-tools to achieve efficiency and competitive advantage. In addition it combines the horizontal functionality of the organization along with the vertical information systems. It is not only buying, selling, and providing customer relationship management online but also integrating all aspects of the business that include all of the suppliers and customers. It also provides the flexibility to redefine business process.

E-business speeds up business processes, bringing the costs down and adding value to the products and services provided. It replaces the traditional tools of business in order to automate and facilitate pre-sale, sale, and post-sale processes. The main components of e-business are as follows:

Supply chain management (SCM):

To reduce the cost of goods supplied to the end customer, and thereby adding to the value chain of the business, companies have introduced online supply chain management in their organizations. Supply chain management is the interconnection or network of suppliers, distributors, customers, and manufacturers to reduce cost and supply the goods to the customer as early as possible with exact customer specifications. It is the effective and efficient way of using the Web to reduce inventory, manage lead time, reduce costs, and share sales forecasts between all the intermediaries to reduce costs and bottlenecks and sustain competitive advantage in an increasingly competitive global economy.

SCM involves a two-way flow of information as illustrated in Figure 1.

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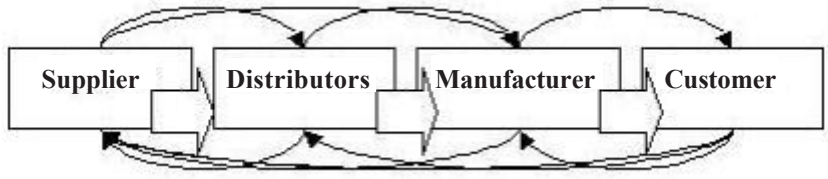
Figure 1. Two-way flow of SCM



Traditional supply chain management was dedicated to private networks, whereas e-business supply chain management is a global network. The e-business model is based on virtual connections and is inter-company rather than intra-company.

Customer relationship management (CRM):

Marketing experts tell us that, "It costs six times as much to acquire a new customer than to keep an existing one." CRM is the implementation of information technology (IT) to integrate all the processes involved in satisfying existing customers and finding new customers. The IT system enables the analysis and differentiation of customer information.

Business intelligence:

Business intelligence is a solution provided to compile huge amounts of data about customers' behaviors and tastes, which can help the organization know what the customers desire and what their buying patterns are. Business intelligence gives a clear and intelligent picture of vast quantities of customer data.

Table 1. Important components of e-commerce

E-marketplace	Online virtual market for buyers and sellers whose common interests are served by establishing an open and public marketplace, for example, e-steel.com.
E-procurement	Online procurement of goods that helps reduce costs, for example, the e-procurement marketplace in the automotive industry called Covisint, formed by GM, DaimlerChrysler, and Ford.
E-distribution	Online distribution system created and governed by sellers to smooth out distribution costs and influence the price of products/services, for example, Petroleum Mexicanos (PEMEX).

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E-commerce:

E-commerce is the online sale of goods and services. It is most successful when the system is built with the total e-business structure in mind. Companies like Cisco, Dell, and FedEx are the pioneers of this integration of e-business with e-commerce.

E-procurement is at the heart of e-business, in particular in the automotive industry. Therefore we will examine e-procurement in detail in the next section.

Overview of E-Procurement

E-procurement is defined as the business-to-business purchase and sale of supplies over the Internet. E-procurement can be done in a variety of ways, ranging from public e-marketplaces that involve many firms in a particular industry to private exchanges for a big company like Siemens. An important benefit of an e-procurement system is that it makes it possible to automate some routine buying and selling. The main reasons for switching to an e-procurement system includes reducing costs, bypassing of unnecessary supply-chain elements, and improving productivity (*http://searchcio.techtarget.com/sDefinition/0,,sid19_gci214418,00.html*, 2003).

One e-procurement model is the sell-side model, or Web shop. In this model, a supplier sets up an online shop and catalog, and buyers from different organizations shop there for supplies. This is one of the simplest methods of e-procurement and is often the first foray into e-business for many small companies.

Another e-procurement model is the buy-side model. A good example is Siemens' e-procurement system, which has a very high volume of suppliers and supplies needed, as well as diverse divisions with different needs, as do the e-procurement systems of large automotive manufacturers. Siemens has set up an e-procurement system called click2procure that provides employees with a view of offerings from different hand-picked suppliers that are familiar with the company's requirements and standard procedures. Siemens' employees can then choose the best price and monitor their orders through the system. Auctions can also be held with this system, and Siemens claims that savings of up to 40% have been realized through the approximately 800 auctions it has held since the installation of the system. A real benefit to Siemens is that all of the transactions are recorded in their system, and that they have control over the cost of goods bought. The high level of process standardization, the transparency created, and, finally, the simplified nature of the procurement process, are important benefits of click2procure (*http://www.click2procure.siemens.de/en/c2p/about/provider/index.cfm*, 2003).

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E-procurement makes sense for firms that could be losing money during the critical process of procuring supplies. In the past companies obtained supplies by using hardcopy catalogs directly from the suppliers or from aggregators that sold products from a number of smaller suppliers. Orders were sent to the suppliers by snail mail, fax, or telephone. The downside to this method of procurement is that it is slow, inefficient, and does not easily lend itself to comparing prices or creating a transparent and well-documented process. Also, a significant amount of non-value-added administrative time is spent on these tasks.

As the Internet grew into a viable tool for business in the 1990s, suppliers began to move their hardcopy catalogs online and created the first sell-side Web shops, which were essentially nothing more than a searchable version of the hardcopy with a simple online purchasing option. Such activities first became possible with the advent of standard online payment and e-commerce security systems (Withers, 2001).

With staggering advances in technology, some firms have begun to recognize the potential for a more integrated e-procurement system. These newer e-procurement systems (public and private exchanges) are not only digitalized catalogs but also include features for storing order information, order tracking, price comparisons, online auctions, and automatic ordering. New generation e-procurement software is made by two different types of companies, "pure play" vendors such as Ariba, CommerceOne (the choice of Siemens for their click2procure system), and Clarus Corp., and ERP (Enterprise Resource software) providers that package an e-procurement system into their complete ERP software system, such as SAP, PeopleSoft, and i2 Technologies. There are advantages and disadvantages to both types, mainly because the pure play software vendors include the most current developments in e-procurement in their software packages, while the ERP vendors include software that is fully integrated into the enterprise system. Of course, the pure-play systems can be hooked into the back-end financial systems, but it is a very complex process.

The value proposition for e-procurement is very high. Automating the procurement process can reduce unauthorized spending, cut administrative costs, and enable companies to better manage purchasing by analyzing spending patterns. Research from the Aberdeen Group in Boston has shown that the average cost for processing a purchase order (PO) manually is $114 per PO. When the procedure is automated, the cost goes down to an average of $31.50 per purchase order. E-procurement also cuts down the time factor of procurement, from over a week to two days (Hildebrand, 2002).

The main value proposition of e-procurement is found in reducing the administrative transaction costs and increasing the portion of procurement time that is spent on the strategic side of procurement. Of course, the overall time of the procurement process will be significantly reduced. Since time is money, this in

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itself reduces costs. Other cost reductions will be found in e-auctions, reductions in administrative errors, reductions in unauthorized purchases (rogue buying), consistency in ordering, and transparency throughout the whole process.

However, e-procurement presents significant challenges for an organization. First of all, the integration of an e-procurement system into the back end of an enterprise system is extremely complicated. Second the expectations of the users and managing the change in systems can be difficult to coordinate because there is often more resistance in the organization to a new system than is expected. Third, getting existing suppliers to take part in the new system is not always as easy as anticipated, even though it can mean cost savings for them as well. Finally, managing the content of the system can also be very complicated (Hildebrand, 2002).

As with any new business initiative, the important question remains: Where does this system add value to the business? Therefore we will examine the topic of the value proposition of e-procurement and other e-business initiatives in the next chapter.

Analysis of the Value Proposition In E-Business

Integrating all the components of e-business can provide organizations with a single, comprehensive network of the different processes and add significant value. E-business integration includes business process automation and linking all of the processes. Integration provides for data transfer, communication flow, and connectivity between different groups through e-tools. The process of integration includes understanding the processes in the specific industry and breaking it up into levels for analysis.

Any investment or new plan proposal must be viewed from the economic side (looking at the external environment influencing the organization, the organization's goals and challenges, and ever-changing preferences of customers and its competitive advantage) to analyze whether it is suited for the organization. The strength of economic analysis comes from its maturity, rigor, and analytical techniques, attributes that are highly desirable for the study of e-business (Walden, 2001).

The automotive industry is one of the most dependent networks of suppliers and distributors for materials (modules such as seats or cockpits). With just-in-time implementation by the automotive manufacturers, the precision time for supplies has become critical. Next is an example of order handling in the automotive industry. The time consumed by each activity before e-business implementation and the time consumed after implementing e-business is compared.

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Table 2. Order handling process (Admova Consulting, 2002)

Process: Order Handling			
Activity	**Responsibility**	**Traditional**	**E-business**
Purchasing Requisition	Disposition	24 Hrs	15 Mins
Examination of Suppliers	Disposition	3 Hrs	20 Mins
Purchase Order Processing	Supplier	24 Hrs	30 Mins
Confirmation of Order	Supplier	4 Hrs	15 Mins
Conformation of Order	Purchase	24 Hrs	5 Mins
Return Product	Logistics	48 Hrs	60 Mins

Process Example: Order Handling

The effective implementation of e-business reduces supply time of the deliverables, reduces the bottlenecks in distribution, reduces costs, and increases profits.

According to the micro-economic law of demand, the reduction in cost increases demand for the product or service given that all other factors are constant. Nevertheless, the competitor could also effectively implement e-business in their strategy. It is therefore the responsibility of the management to utilize e-business to remain competitive, not only to increase profits. To emphasize the importance of both strategic management and economic analysis, we compare Covisint, an e-procurement site for the automotive industry with Volkswagen AG's in-house e-procurement system in the later section.

Table 3. SWOT of e-business

Strengths	**Weaknesses**
Improve efficiency and effectiveness	High cost of implementation
Lower cost and increase profit	Difficult to integrate all components
Assist senior management in decision making	Cooperation and trust of suppliers and buyers
Improve the industry and all dependent organizations	Upgrade of the legacy system and physical components
Opportunities	**Threats**
Integration of global markets	Data transfer and security
Competitive advantage	Failure of forerunner companies
Emergence of digital firm	

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General SWOT Analysis Of E-Business

Table 3 illustrates the strengths, weaknesses, opportunities, and threats (SWOT) of e-business.

E-Business in the Automotive Industry

Research Methodology

The automotive industry is one the most important industrial sectors in terms of revenue, global market share, technology innovation, and design. Therefore, we chose one of the large, global firms in this industry, Volkswagen AG, to provide our readers with a practical case example of e-business system applications.

We focused primarily on B2B, as it is one of the most representative e-business components in the organization of car manufacturers. Nevertheless, it would be interesting to see future research covering all e-business components, projects, and initiatives in depth.

Overview of E-Business in the Automotive Industry

E-business plays a very important role in the automobile industry in reducing inefficiencies, enabling collaborative design and production globally, connecting supply and demand, and optimizing sourcing from various parties. Many functions are now at least partly carried out through Internet technologies, such as design and R&D through internet-based EDI; purchasing and wholesale through business-to-business systems (B2B); marketing and commerce through business-to-customer systems (B2C); management and accounting through e-management; internal and external communication through e-mails; and other Internet-based medias such as Web conferencing and training through e-learning.

The benefits realized from the Inbound Planning Engine (IPE), the supply-chain decision-support tool of Ford Motor Company, are described in this quotation from their director of global logistics:

If you just take a reasonably decent network and simply apply the IPE program, you can achieve a boost in efficiency from 20% to 30%. In terms of efficiencies for the inbound materials program, we're not just looking to save freight costs at Ford — in some cases we're holding freight costs constant while significantly increasing delivery frequency to move toward

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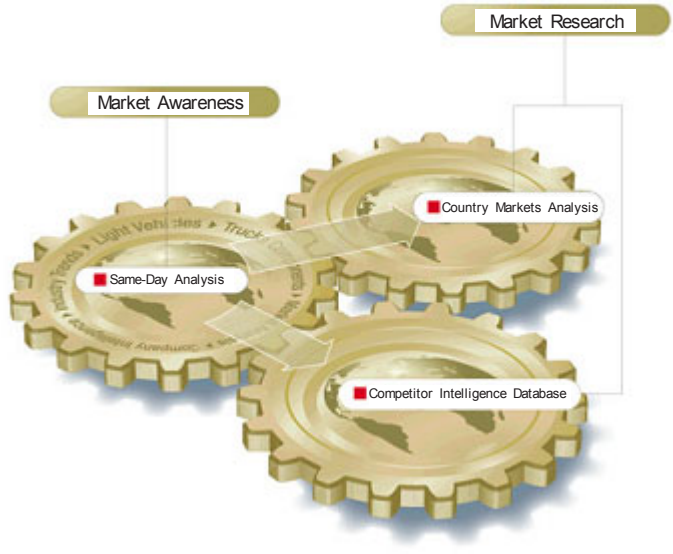
more of a lean logistics network and ultimately to the lean manufacturing environment. And where we have implemented the IPE plan, we have gone from an average of 22% of our parts being delivered at least once a day to 97% being delivered once a day. That in itself is a huge benefit to Ford (Hoffman, 2002).

Among various forms of e-business, B2B systems have been attracting much attention for their seemingly vast potential to cut costs and create new business formats. Within a traditional manufacturing industry such as the automotive system, e-business is a true revolution in industrial organization and managerial practices. It clearly requires new business models. As an example, we describe the e-business service for the automotive industry provided by a company called World Markets Automotive (WMA). WMA is an innovative automotive intelligence service that provides companies with comprehensive reports on more than 50 countries and 150 vehicle and components manufacturers. It is a kind of data analysis technology. The main services provided by WMA are illustrated in Figure 2 and include daily analysis, country reports, and competitive intelligence reports. One of its main services, unique same-day analysis, is complemented by an industry database that tracks information on vehicle sales and production. Country reports cover sales, distribution, and production in the individual country. As for competitive intelligence, it provides an evaluation of potential competitors,

Figure 2. Three main functions of the World Markets Automotive (WMA)



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suppliers, or customers. Also, there are strong databases with comprehensive sales and production information (*http://www.wmrc.com/wma_a.html*, 2003).

To get a better understanding of how an automotive manufacturer implements e-business systems, we examine Volkswagen AG as a case study in the next section.

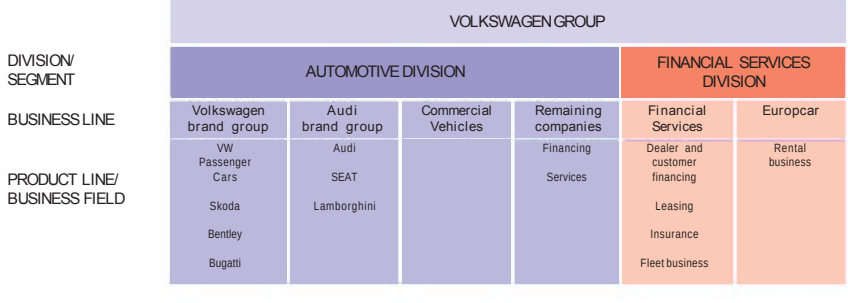
Introduction to the Volkswagen Group

The Volkswagen Group, with headquarters in Wolfsburg, Germany, is one of the world's leading automobile manufacturers and the largest car producer in Europe. In 2002 the Volkswagen Group achieved the second-highest profit before tax in the company's history at • 4.0 billion. The 2002 group sales totaled • 86.9 billion (2001: • 88.5 billion). With 4,984 million (2001: 5,080 million) vehicles delivered to customers in 2002, the company attained a global market share of 12.1%. In Western Europe, the largest car market in the world, nearly every fifth new car came from the Volkswagen Group.

The group's passenger car business is divided into two brand groups. Under the leadership of the group, the Audi and Volkswagen brands are responsible for the results of their respective brand group worldwide. Audi's brand group is made up of the Audi, Seat and Lamborghini brands.

The Volkswagen Brand Group is made up of the Volkswagen, Škoda Auto, Bentley, and Bugatti brands (see Figure 3). Each brand retains its differentiated brand-image and operates as an independent entity on the market. Together the product ranges extend from the low-consumption three-liter vehicle to luxury-class vehicles. The group's commercial vehicles are the responsibility of the Volkswagen Commercial Vehicles brand (Volkswagen Nutzfahrzeuge) (Volkswagen AG, 2003).

Figure 3. Divisions and brand groups of the Volkswagen Group (Volkswagen AG , 2003)



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See Appendix A for more detailed information on the Volkswagen Group.

E-Business at Volkswagen

The Volkswagen Group and most other big automotive companies started to strengthen and to consolidate their e-business activities at the end of the 1990s. Some research publications predicted many advantages after the implementation of e-Business. American carmakers could expect the following savings (Lapidus, 2000):

- Savings of $3,650 per vehicle or total cost reduction of 14%
- Supply chain cost savings of $1,064 per vehicle
- Further savings potential from make-to-order and online direct sales

Other analysts predicted lower potential savings for Europe and Japan compared with North America. The following advantages were mentioned (Deutsche Bank, 2000):

- Purchasing and auctions will make up a third of the B2B cost savings
- Cost savings in Japan: $540 per vehicle
- Cost savings in Europe: $640 per vehicle

Figure 4. Budget/investments for 2001 in e-business

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The advantages of e-business were clear for the automotive industry, so Volkswagen decided to consolidate all activities in this area. Volkswagen Group currently has more than 250 distinct e-business projects running worldwide.

B2C is business to customer, B2B is business to business, E2E is engineering to engineering and B2E is business to employee

Volkswagen has used e-business largely in its core processes and value channels. It has moved into the world of e-commerce by building extranets for B2B and B2C commerce. Like other companies Volkswagen is moving toward sharing data with customers and suppliers, and taking advantage of the Internet's ability to disseminate information at lower costs and higher speeds than ever before. In the long run, Volkswagen Group wants to connect all business processes, from product development to production, among suppliers, dealers, and customers over the Web (Schwartz, 2001).

Based on the volume of projects at Volkswagen AG, we will focus our analysis on its B2B initiatives and then explore some of its B2C initiatives.

Business to Business (B2B)

Volkswagen developed its own marketplace, deciding in favor of an in-house system instead of joining Covisint. The following were the reasons for this decision:

- More advantages from optimized processes (at Volkswagen)
- Strengthen competitiveness
- Avoid suboptimal compromises
- Security of proprietary information

The system partners for the development and implementation were i2, Ariba, and IBM (for software and hardware). The implementation took place in 2000, a year before Covisint was launched.

E-Procurement

Volkswagen has not only reorganized its processes but also created the right technical requirements for an easy integration of the supplier industry. To date 500,000 transactions have flowed over the e-marketplace from around 5,500 suppliers. The primary capabilities offered include online purchasing, auctions, and capacity management. The e-marketplace's catalog holds 360,000 products. To date, more than 600 online negotiations have been conducted by more than 4,000 suppliers. With Volkswagen Group's capacity management system, called

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eCap, suppliers and Volkswagen Group share requirements and capacities quickly online and can view Volkswagen's annual, monthly, and weekly planning, all of which result in lower inventories throughout the supply chain (Kaneshige, 2001). Volkswagen Group says process time has decreased by 95% through the simplification of procurement procedures and the optimization of logistical processes. Volkswagen says it has passed the break-even point for e-business investments through process and material cost savings (Kaneshige, 2001). As mentioned above Volkswagen's e-procurement and sourcing was moved from a hosted to an in-house model because Volkswagen's board of management wanted to assure that there was only one access point to the sensitive data for the company as well as for its partners. Thus managers thought that this could only be achieved if the software was running on Volkswagen servers (Schwartz, 2001). Next we discuss the three B2B systems at Volkswagen that have been used since 2000.

Catalog Ordering Process

With the transaction software (Ariba), it is possible to order material (c-items like laptops, stationary material, indirect production items) on an Internet-based catalog directly from the supplier. The prices are negotiated beforehand by the procurement department. The payoff from developing and implementing this system was quickly realized. The savings were achieved by reducing material cost (reduced price due to the direct buying scale effect), reducing process costs (just-in-time delivery and reducing personnel numbers), and reducing "soft costs" (other transaction costs).

E-Auction/E-Negotiation

By developing a Web marketplace, Volkswagen was able to negotiate over the prices of parts in a more effective and efficient way. In the past, it took four to six weeks to choose the right supplier for a special part. The procurement procedures were also very personnel-intensive. After the introduction of the Web-based negotiation, the competition between suppliers was more transparent. The key advantages of the Web marketplace to Volkswagen were:

- Drastic reduction in negotiation time
- Reduction of human capacity (which was used for other procurement tasks)
- Suppliers from different continents involved in the negotiation process
- More transparency about the market offerings (supply)
- Better results after negotiation

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The procurement cost (transaction cost) per part is reduced by the use of the Web-based marketplace.

E-Capacity

In order to do need and capacity planning, Volkswagen developed a communications platform with internal and external suppliers. The suppliers and the purchasing department are involved in the common planning process. Using the Internet, these departments are able to exchange information about the needs or demands and the capacity of different suppliers. With this information, simulations can be run to define different scenarios, which is important for decisions. Involving the customer and the supplier, the production can be planned more effectively. The result is a win-win situation for the three partners involved (customer, supplier, and original equipment manufacturer (OEM), in this case Volkswagen).

The key advantages are:

- Suppliers know about Volkswagen's demand (middle-term and long-term planning)
- Reduction in freight and warehouse costs due to better planning
- Enables supply Chain management
- Early recognition of bottlenecks (material to be delivered)
- Optimization of procurement

Using this system, Volkswagen makes sure that important parts are always available to manufacturing plants.

Today e-business is a standard tool at Volkswagen. Successfully implemented projects have been rolled out to the other companies of the Volkswagen Group.

Other E-Business Initiatives at Volkswagen

Volkswagen is involved in many different e-business projects. Some notable ones are discussed next.

E-Commerce in U.S. and Canada (B2C)

Today customers from Canada and the U.S. can visit *www.vw.com* to custom-configure a vehicle and access a variety of information. Making the Web site as e-commerce optimized as possible is key to the company's overall strategy. This

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is the first contact with the customer, and all of the group's advertising is focused on getting customers to go to its Web site.

By this token, Volkswagen developed an online B2C application to sell limited editions of cars for the U.S. market via the Internet at www.vw.com. This pilot was developed to test customer response to online buying that allows customers to learn about the models, pick a dealer, configure a desired car, check its availability within Volkswagen's distribution system, get financing, discuss purchasing terms, and, finally, arrange a delivery date, all online through a dealer selected by location. Rather than farming out the online buying model to a third party or some other channel of online sales, Volkswagen supported the entire enterprise, including the brand, customers, and dealers, recognizing that dealers are a critical part of the Volkswagen value chain to customers (*http://www.silverline.com*, 2003).

The danger of the pilot online B2C system was that it created channel conflict between Volkswagen AG and its dealers, because the Web site sent the customers to a dealer selected only by location. Due to its failure in solving the channel conflict problems, Volkswagen did not develop the pilot program into a worldwide model. Instead, today, the Web site only offers the possibility to create various vehicle configurations and get a quote sent to the customer by a dealer. However, start-to-finish online sales are not offered.

Information is a key point in today's business, and Internet suppliers and other Volkswagen business partners have varying degrees of access to this information. Depending on their level of access, partners and suppliers can access parts data, accounting and invoicing information, and training materials, all housed on various Oracle databases, and, still depending on the access level, some can not only view material, but manipulate it (Schwartz, 2001).

E-Business Strategies With Dealership in Canada (B2B)

Since Volkswagen believes that its dealers are the core of its business, it expanded its U.S. dealer e-Business program into Canada so that the company has now the ability to more efficiently offer its vehicles and services to a much larger audience. The idea of extending its online presence into Canada consisted of providing 150 Canadian auto dealers with e-business marketing and reporting tools, and custom French- and English-language branded Web sites (Anderson, 2001).

Online CRM in Germany: Autostadt

One of Volkswagen's corporate objectives was to develop a strategic investment in building long-term, online customer relationships. One outstanding idea

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was to create an ever-changing marketing venue where visitors could experience state-of-the-art automotive technology. Buyers could collect their new cars from one of the park's automated glass-and-steel towers. As a result, in 1999, after defining Volkswagen's business as production of adventures and values, an information technology (IT) infrastructure that would support this unique and highly customer-centric automotive theme park was built, named Autostadt, or "car city," which is located near Wolfsburg, Germany. So far it has attracted more than 6 million visitors. Some 6,000 per day have visited its car museum and six brand pavilions, which offer a variety of interactive and computerized exhibits and Web-based point-of-information (POI) terminals. Most importantly 349,000 of Autostadt's visitors have taken delivery of new cars. This is the theme park's key success indicator, since its end goal is to impress every person who comes through Autostadt to the point of buying a new car (King, 2003). This involved the combination of different systems such as Volkswagen's mainframe-based factory systems, proprietary Unix-based systems that run the car towers, plus packaged and proprietary Web-based applications written in Java for reservations, customer service, and multimedia entertainment systems. All of this information comes together at Autostadt over a three-tier information architecture called the Integrated Autostadt System (IAS) illustrated in Figure 6. This is governed by Vignette Corporation's V6 Content Suite software, which functions as the Web-based window through which information about car deliveries, event bookings, and daily ticketing, plus reservations for the Autostadt-owned Ritz-Carlton Hotel, are drawn together. The system presents information to Autostadt and Volkswagen employees based on their predefined roles. The architecture also provides Internet and intranet services that let customers and employees access more general information (King, 2003).

All software and hardware upgrades and other changes must take place after visiting hours, that is, after 10 p.m., since the park is open seven days a week, 52 weeks a year, and all systems must operate at 99.95% reliability for at least 12 hours per day. On the software side, the Vignette system functions as the digital heart and soul of the IAS and Autostadt as a whole. Vignette is not a solution itself, but it is a development environment, or tool kit for making applications, and an area in which Volkswagen's managers have huge know-how. Autostadt began using Vignette StoryServer Version 4.2 in June 2000 because it was the best fit for meeting the company's e-business objectives. The car distribution center uses Vignette applications as a notification tool for customers; whenever a dealer sells a vehicle, they give the buyer a customer card, much like an encoded credit card. Buyers then use their customer code online to find out when their car will be ready and arrange a pick-up date.

The Web sites include www.autostadt.de, where consumers can buy tickets, reserve a hotel room, or learn more about the theme park and educational and entertainment events, and www.autosphere.autostadt.de, which features flash

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animation, films, and music for visitors with a high-speed Integrated Services Digital Network or Asymmetric Digital Subscriber Line connection. Both sites are populated with content from the Vignette server and were completed by the three in-house Vignette developers, who worked on them full time for six months (King, 2003).

Autostadt's three-tier information architecture (center) is the Web-based window through which information about new-car deliveries, event bookings, daily ticketing, and hotel reservations is drawn together.

E-Procurement in Action: Comparison of Covisint and VW Supply.com

Covisint

B2B exchanges can dramatically transform the way in which companies do business with each another. An example of such a B2B exchange is Covisint, which was formed to meet the needs of the automotive industry. The name Covisint stands for **Co**operation, **Vis**ion, and **Int**egration. Covisint was created by DaimlerChrysler, General Motors, and Ford Motor Company and began operations in the U.S. on January 1, 2001, and in Europe, Asia-Pacific, and Latin America in July 2001. Renault SA, Nissan of Japan, and PSA Peugeot Citroen have also joined the automotive e-marketplace (*http://www.upenn.edu/researchatpenn/article.php?335&bus*, 2001).

According to experts, the automotive industry is not integrated enough and the flow of information is not satisfactory. The lack of information is causing expensive inefficiencies that pose an enormous cost to the industry. The most important are the costs of processing and managing quality process, which are estimated to amount to $6 billion to $8 billion, and the costs of administering warranty at $2 billion to $3 billion. The asset utilization is less than 50%, and 30 days on average are wasted on waiting for a response from suppliers to each quote. Experts estimate that $3 billion to $4 billion of excess inventory becomes obsolete due to inability to inform about design changes, and 15% of all tooling is obsolete before it is used. Moreover the costs of transportation are three times higher due to premium freight. Platform development taken into consideration, about 25 % of time is wasted on duplication of work and waiting for responses (*http://www.covisint.com/about/pressroom*, 2003).

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Covisint is a technology services company whose applications and communication services connect the global automobile industry. It cooperates with manufacturers, suppliers, and industry trade groups worldwide to define and implement effective common processes for the whole industry. It enables them to reduce costs and make business operations more efficient.

The three major goals of Covisint are:

- Promoting collaborative product development by harnessing the Internet's communication powers.
- Streamlining procurement in the industry by launching market mechanisms such as auctions.
- Lowering the cost of cars by up to $3,500.

(*http://www.upenn.edu/researchatpenn/article.php?335&bus,* 2001)

VWGroup Supply.com

VWGroup Supply.com was created in 2000 by the Volkswagen Group in order to reap the benefits of e-procurement for the group, which has a worldwide purchasing power of • 50 million. At this time, Volkswagen was contemplating joining Covisint. While Covisint seemed to hold a promise of huge cost savings and streamlining of procurement processes, Volkswagen eventually decided to create a proprietary e-procurement system. In the beginning, VW was using an outside procurement system from eBreviate, an online sourcing company that is part of the ATKearney group. It then decided to move the system behind the company firewall, and build it out for the significant cost savings and customization that it was looking for.

Volkswagen's decision to not join Covisint made ripples through the automotive industry. The main concern VW had with Covisint seems to have been security issues and worries about the quality of a shared platform. Volkswagen states that, "Joining a public initiative generally means that numerous participants have to find the 'lowest common denominator,' and thus their own processes cannot be displayed in a satisfactory way anymore." Furthermore, it claims that, "…we want to be sure that sensitive data are only exchanged between [the supplier] and our company." Another key point was the potential cost savings of a proprietary exchange. The private exchange allows VW to run as many auctions as it wants without worrying about the transaction fee. With a private system the cost goes down with every new auction it runs. The e-procurement system includes online catalogs, inquiries, negotiations, and capacity management. The final platform was launched in summer 2000 and was created with five strategic partners,

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ATKearney (eBreviate), IBM, Ariba, gedas, and SupplyON. To date VWGroupSupply.com has conducted more than 3,190 online negotiations, with 22,000 suppliers participating (*http://www.vwgroupsupply.com/VWPortal/Navigation*, 2003).

Volkswagen's decision to not join Covisint raised some serious questions about the value proposition of the public B2B exchange. Covisint promised cost savings by hosting applications for the automotive industry and setting standards. However, many suppliers are still resisting Covisint because of the risk that it will treat highly customized products as commodities. Also, working with a public exchange means less choice and customization for the automotive manufacturer. Eventually, it would have to accept a standardization that was not 100% acceptable. Covisint has not gained much support beyond the big three automotive manufacturers, with companies like VW, BMW, and Honda building their own proprietary systems, which received support from suppliers. In terms of the value proposition Covisint was not completely able to follow through on this promise. In contrast, companies claim that their private systems have already paid for themselves through process and material savings (Karpinski, 2002).

Limitations of Research, Recommendations, and Conclusion

Although our research was carried out as rigorously as possible with regard to verifying sources and only including the most pertinent information, the field of e-business, e-procurement, and e-marketplaces is a rapidly changing one. Additionally, it is not always possible to have complete transparency into an organization's e-business strategies and solutions, nor their motivations and background in their choice of a system or an upgrade. Although we had to rely on secondary sources for our discussion on all companies mentioned, we believe that our information on these companies is as accurate as possible.

In this chapter, we have described the main components of e-business, including SCM, CRM, business intelligence, and e-commerce. We have given specific examples of successful e-procurement and e-marketplace systems in the automotive industry and some of the limitations of these systems. Through our exploration of the value proposition of these systems, we have come up with some recommendations for the industry manufacturers who are implementing or updating these systems.

Company executives should be completely aware of the potential benefits and costs of these systems. They should also be aware that some systems, like the

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e-catalog at Volkswagen AG, can provide a noticeable financial benefit quickly and easily, but others are more complex, and therefore their benefit is not so easily measured. However, both types of systems can give competitive advantage to a firm. Another key point is that the most successful companies tend not to be early adaptors of new e-business technology tools but rather quick followers. It is a good strategy to wait and see whether a new technology has staying power in the industry and provides real value. It is also essential to ensure that the organization's goals are aligned to the system's capabilities. In fact, this point extends to all of the elements affected by any new system, in effect the people, processes, and the planning. In the case of an e-procurement system, the suppliers must be a part of the strategic planning process. This is absolutely necessary if the system is to function and to provide any real benefit to the company involved.

A general tip for the implementation of any type of system is to focus on the core processes and value channels so that it will not only help to reduce large inefficiencies but also add value to customers and suppliers. First, identify the critical processes and later define and focus on the most important components that will add the most value to the organization. The amount of time and money that is invested in e-business initiatives should be proportional to the size and amount invested on average in the industry, or else it is likely that the cost will exceed the competitive advantage gained.

A specific point that was discussed in this chapter was the decision that Volkswagen AG made in creating its own proprietary e-procurement system instead of joining Covisint, a public e-marketplace. We believe that the decision that a company makes should be based on the following three points: First, does the company see a need to protect its information assets from competitors? Is there a significant risk of compromising its competitive advantage if some information about its purchasing habits could be accessed by outsiders? Second, the cost consideration must be taken into account. Volkswagen's system was able to pay for itself quickly, but this may not always be the case. A rigorous study into the costs of a proprietary system must be undertaken before ruling out the use of a (possibly) cheaper public e-marketplace. Third, and perhaps most importantly, the company must ascertain whether its suppliers are willing to take part in a proprietary system. Volkswagen found that its suppliers were willing to be a part of VWGroup Supply.com, but this is probably only the case because of the huge purchasing volume of the group. A company with a smaller purchasing volume could have trouble convincing its suppliers of the need to switch to a new system.

In conclusion, we would like to stress the need to examine the structure of the organization before planning or upgrading a system, or before joining an e-marketplace or exchange such as Covisint, to be sure that the solution fits the organization's specific requirements.

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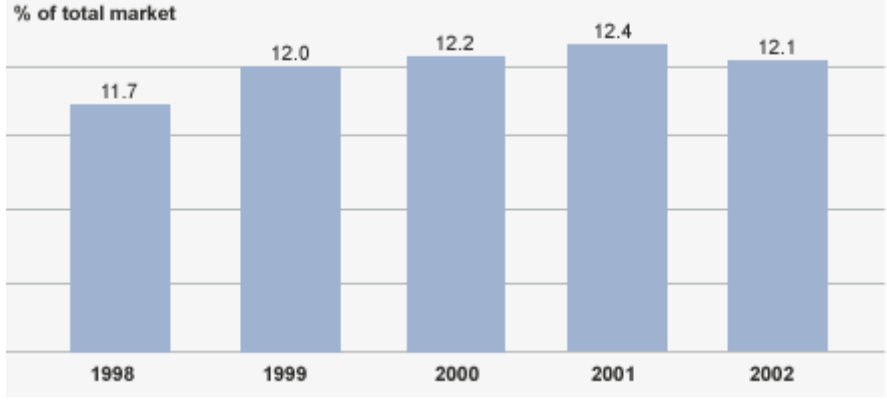
Appendix A: Key Information on the Volkswagen Group[1]

Key data January - December 2002

Volkswagen Group		2002	Change vs. 2001 (%)
Deliveries to customers	'000 units	4,984	- 1.9
Production	'000 units	5,023	- 1.7
Workforce	December 31	324,892	+ 0.9
Sales	million EUR	86,948	- 1.8
Profit after tax	million EUR	2,597	- 11.3

Volkswagen Group Key Figures 1998 - 2002

Share of Passenger Car Market worldwide



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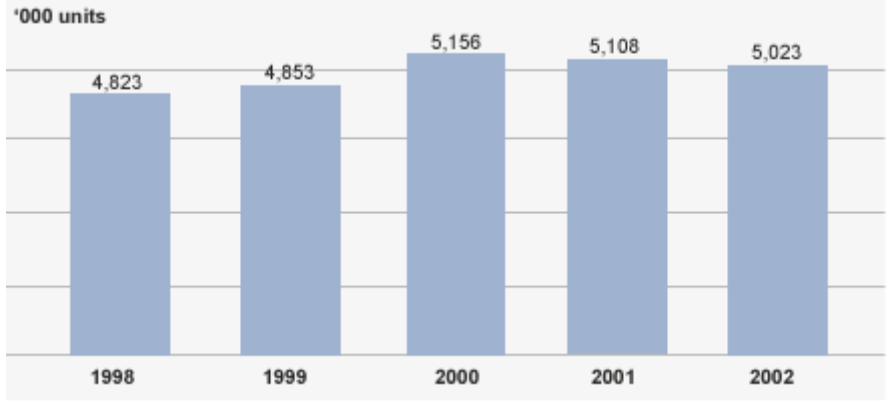
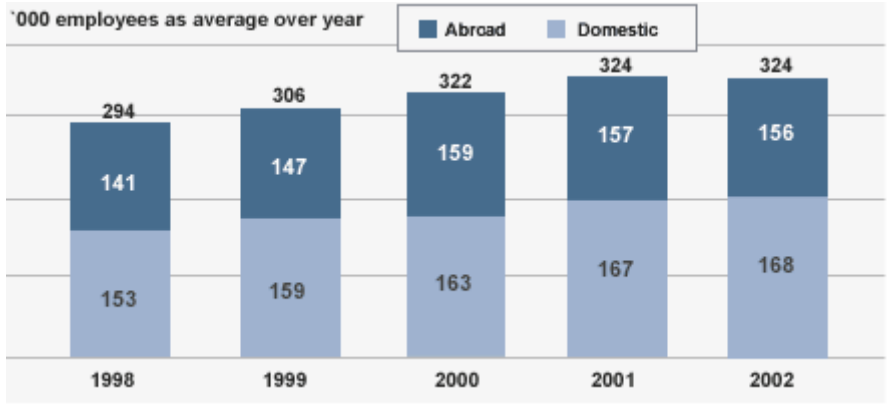
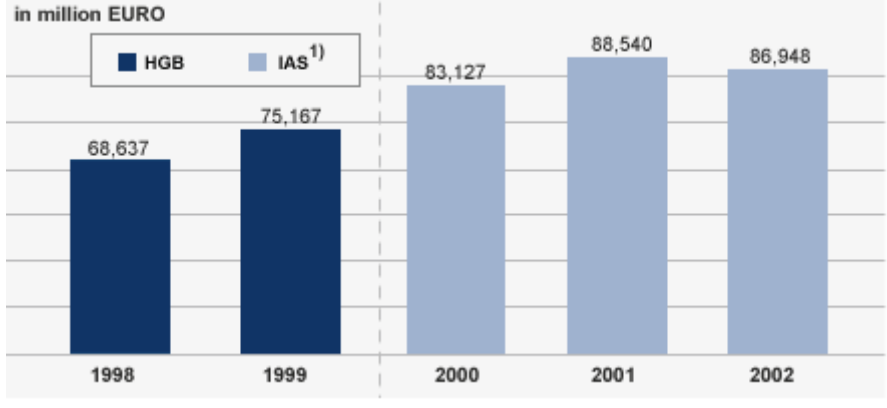
Production



Workforce



Sales Revenue



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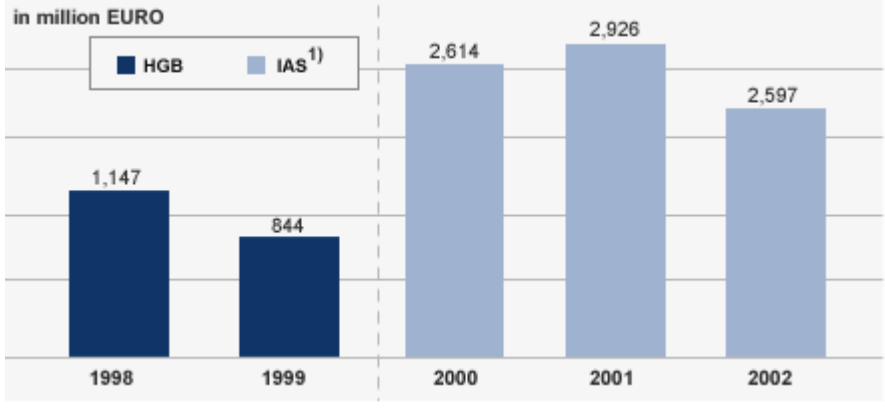
Profits after Tax



The financial statements drawn up in accordance with International Accounting Standards (IAS) are not comparable with figures prepared in accordance with the German Commercial Code (HGB).

Production facilities worldwide

Endnotes

1 Source: http://www.volkswagen-ag.de/english/defaultIE.html

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Chapter XIII

Global Information Systems in the Publishing Domain:
An Experience Report

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Abstract

This chapter discusses how globalization in the publishing domain is achieved through global information and communication systems. Global information systems (GIS) enable not only integration of applications within an organization (leading to what is known as EAI), but also enable extensive connectivity between applications across varied platforms and software domains both within and outside the organization. This timely connectivity has created tremendous opportunities for the publishing industry — increasingly dependent on split-second timings to report news — to integrate its business processes as well as devise new and innovative ways of collecting, assimilating, and disbursing information. This chapter

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is based on the experience of the lead author in one of Australia's largest publishing groups, John Fairfax Holdings Ltd.

Introduction

This chapter deals with the application of the concepts of GIS to a news, advertising and information publishing business. GIS encompasses a gamut of technologies and business facilities that are based around the concept of information creation and management and, more importantly, information sharing through excellent communication mechanisms. This, together with the innovative business process thinking, creates an ideal environment for globalization of various types and sizes of businesses. GIS includes understanding, discussion, and application of business alliances, analysis and segmentation of the e-customer, application of the concept of Customer Relationship Management (CRM), Supply Chain Management (SCM), Digital Nervous System (DNS), and global project management. Technologies like XML, encompassed by Web services as well as mobile applications, all come together under the umbrella of GIS and facilitate the globalization of enterprises (Unhelkar, 2003b).

This report is based on the experience of application of systems and technologies of GIS to John Fairfax Holdings Ltd., a globally well-known publishing business established in Sydney, Australia. Fairfax is known for its publications of the Sydney Morning Herald, the Melbourne Age, and the Australian Financial Review together with a group of regional newspapers, magazines, and a comprehensive set of dominant Web sites containing both editorial and classified advertising content.

Application of the concepts of GIS in Fairfax happened simultaneously with the significant contribution made by communication technologies in the news, news advertising, and publishing domain. This is so because of the need in the publishing domain for split-second timings in reporting, acute need for independence from time and location, and the need and ability to correlate events and reports that may have happened far back in time and perhaps in unrelated places. Given the availability of technologies as well as constant pressure from competitors, this particular publishing organization decided to apply GIS to reach a wider audience and clientele not only within the greater regional areas of Australia but also across the world. This chapter describes in detail the concepts of GIS and how they are applied by an organization like Fairfax to achieve competitive advantage in the publishing domain.

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Understanding E-Publishing

What is E-Publishing?

E-publishing results from the application of GIS to a publishing organization. It is therefore appropriate to start this discussion with an understanding of what can be considered as e-publishing. Ciolek (1997) defines e-publishing as: "Electronic publishing activities are aimed at systematic harvesting, processing and delivery of substantial chunks of information (scholarly/factual materials, news, software, entertainment, games, etc.) in electronic format to the public (users, purchasers)."

The resultant electronic information can be distributed either:

- via a network (LAN, WAN, Internet, intranet) or
- on physical media such as computer diskettes, tapes, CD-ROM disks.

They can be made available either free-of-charge or at some cost to the user.

The above definition makes it obvious that e-publishing is heavily dependent on information and communication technologies. Thus, e-publishing cannot exist without the World Wide Web and its associated infrastructure. However e-publishing has also come into being and proliferated because of the available connectivity in large number of modern households as well as institutions such as schools and universities. In this communication age huge amounts of information are made easily available electronically at the fingertips of most individuals and organizations that are able to access and consume this information. Thus e-publishing is emerging as a robust reality with implications for businesses as well as society. E-publishing is facilitating a new way of collating, distributing, and presenting information that is unique to the communication age. It is a new reality that is set to become a part of the everyday routine of individuals as well as organizations.

Current State of E-Publishing in Australia and Fairfax

Having mentioned what e-publishing comprises and its tremendous importance to modern businesses and individuals, we will now consider the state of publishing within Australia and, in particular, John Fairfax Holdings Ltd. To start with, electronic publishing (e-publishing) in the major metropolitan newspaper segment of the publishing market has undergone some fundamental changes in the

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last two to three years. These changes can be found in three discreet areas of e-newspapers:

- classified advertising
- display advertising and
- editorial presentation

Classified advertising may be defined as advertisements whose cost is based on a rate per line or centimeter basis plus added extras such as logotypes, small images, and some elaborate borders and their appearance online. Additionally such advertisements are usually entered into a publishing system by (still in-sourced) call-centre staff. Up until this time last year these advertisements were assembled for publishing in the conventional print medium and then passed across to a relevant Web portal such as real estate, motors, or employment. This was done at no extra charge to the client. By definition these advertisements have first appeared on classified pages, typically with no editorial content.

John Fairfax Publications Ltd., publishers of The Sydney Morning Herald (SMH) and the Age, recently enforced a significant but subtle change in the way these advertisements are sold. An "assumptive upsell" was introduced. This is where the customers on the phone to the call-centre staff are charged a percentage extra over the conventional costs in order to allow the advertisement to be published on the relevant classified web portal owned by Fairfax (MyCareer, Domain, and Drive). The online division of Fairfax is known as Fairfax Digital. This division is still somewhat experimental in that they are edging closer and closer to break even in their costs versus revenue equation. Once they are able to stand alone, without the support of the more conventional printed product base, they will be an even more significant revenue centre for Fairfax as a whole. The standard dialogue with the public does not require the ad taker in the call-centre to identify this extra charge. However if the customer inquires as to the make-up of the costs of the ad, the portion of the cost attributed to appearing on the web is revealed. The client then has the option to decline that portion of the cost and therefore the publishing of the ad on the Web. Few customers decline this extra service. Naturally the portion of the cost of the advertisement being published on the Web is counted as revenue for the Web division of the Fairfax. Is the Web site portal really self-supporting in this case?

In the area of display advertising (defined as a pre-booked space followed at some later time with some complex creative art work and published on a news/editorial page) there are some clever Web sites such as that of the Wentworth Courier in Sydney's eastern suburbs (*www.wentworthcourier.com.au*). If an advertiser purchases a display advertisement in this publication, then, as a result,

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the readers are offered more options in such e-published ads compared with readers of print pages. For example, registered site users of these electronic publications find that some of the advertisements have hot links within them that are activated when a mouse passes over them. For instance, if there were an e-mail address within the ad it would become active, or hot, and would prefill an e-mail header if the viewer of the page clicked on it. Further to such small but significant innovations, the editorial components of the newspapers now published online are expanding their depth and capabilities. For instance, the SMH once only published online news items after they had been published in the conventional printed product. Now updates to articles and even late-breaking news are also published online prior to the printed page containing this information. An example of this was the Sydney Olympic Games, where the SMH portal recorded record hits with information uploaded almost as it was being reported and recorded from the various Olympic venues. Furthermore interactive products like crosswords — which obviously could not be deployed in their electronically interactive format in the physical papers — are now available from within the major newspaper editorial online portals (such as smh.com.au) and are proving to be quite popular and represent higher-than-expected hit rates.

E-publishers like Fairfax are now providing their customers direct access to some of the core publishing systems or back-end systems via extranet-like mechanisms. This allows the advertisers to enter both classified and display advertisements for publication into the newspaper and online. These activities provide a win-win experience for both the publisher and the advertiser (more on this subject later). The publisher has the advertiser do the actual work of entering the advertisement (thereby reducing staff in the contact centre), and the customers have the benefit of an instant quote and image preview of what the ad will look like when printed.

Finally, on the editorial presentation, provisions are being made to allow numerous editorial activities to be deployed online. These include activities such as comments and letters to the editor, running editorial surveys and publishing the results almost instantaneously, and enabling community sporting groups to upload weekend sports results to the relevant Web sites where they may be published online. This data and information is eventually passed over to the print publishing systems, but before that stage this information has achieved a certain valuable purpose due to e-publishing.

Considering all the above, within Australia and globally, it is quite clear to the Fairfax strategists that they need to understand and serve their customers in line with the e-publishing facilities that are becoming available and that are almost expected by the customer. This requires proper understanding of the requirements of the customer today and in future. Furthermore the e-publishing organization has to anticipate changes and rely on technologies to provide the

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infrastructure needed to deploy such e-publishing business. This matching of the technology and provisions of e-publishing with the requirements of the customers can only be achieved by undertaking a regular and comprehensive customer analysis.

E-Publishing Customer Analysis

Major metropolitan publishers such as Fairfax and News Ltd are beginning to see evidence (Hornery, 2000) of trends of the customer, resulting in changes to some business practices. For example, as more and more school children, taught with the presence of the Internet, become consumers and become time-poor, they are naturally accessing the Internet to obtain their newspaper-like fulfillment, just as they do for banking and many other services.

Despite such trends, though, it is worth mentioning that so far, this move toward online information has not been at the expense of the printed product (newspapers), although the printed product has had to change considerably to remain competitive with the corresponding electronically published product. Witness the ubiquitous color presence throughout the papers and the more targeted sectionalization such as the classified portals like Drive, MyCareer, Domain, Good Living, and so forth. In fact Fairfax spent considerable time defining the names of the three major classified portals: Drive.com.au, domain.com.au, and mycareer.com.au. Each of these portal names are fairly obvious, reflect the content of the sites, and are easy to remember. These names also make sense to a cross-cultural market as recommended by Deitel, Deitel, and Nieto (2001). These changes to newspapers have facilitated circulation and added value to what is being offered physically as compared to the electronic versions. However the classifications and electronic portals are on the rise and, together with the mobile technologies on offer, are expected to provide a tough challenge to printed newspapers in terms of availability and readability.

Customer satisfaction is an excellent indicator of the future revenue and profits for a business (Best, 2000). In the newspaper industry revenue comes mainly from advertising; in Fairfax's case, more than 80%. Hence high hit rates attract advertisers on the Web site and in return increase income source for a company like Fairfax. In order to keep the hit rates up and therefore the attraction for advertisers, the Web sites have to be reliable, professional, and interesting. This required Web site quality will help in keeping customers loyal, which is crucial in stabilizing business profit. "In general, it costs five times more to replace a customer than it costs to keep a customer" (Best, 2001, p. 17).

Fairfax's Web-based AdOnline product recognizes certain regular business customers based on their login identity. The site inserts that customer's business

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logo or trademark onto the Web page, making them feel that Fairfax knows and values them. Involvement and sense of belonging always prove the major attraction for people coming back to a Web site (Stewart & Eugene, 2001).

The changing publishing paradigm, especially with respect to Fairfax, has had an effect on the three main customer types of the publishing organization. These three identities are the e-advertiser, the e-reader, and the e-employee. These are further discussed.

e-Advertiser

Within this new publishing paradigm interaction with the advertiser has changed significantly. In the case of the advertiser providing material to be published in the printed product, there are now a number of alternatives available. Some publishers, like Fairfax, provide Web sites that allow regular advertisers who require template-based display and or linage advertisements to construct those ads themselves. This web site is generically called internally "AdCompose." A typical advertiser in this category would be real estate agents who publish similar advertisements each week. Once constructed those ads can be downloaded into the required backend publishing system. This service allows the publisher to ensure that the quality of the constructed image strictly conforms to the mechanical specifications of the printed product. For instance, when a new display ad is created for publication in the SMH, the template will already have been preset in an acceptable dimension for that publication. If the advertiser wanted an ad to be 3 columns wide and 10 centimeters deep, then the template for an ad of this dimension will be available in the template library or the advertiser can construct such a shape. The system will not be able to construct a shape that is not an even multiple of a set number of columns to centimeters. An advertisement 3.5 columns wide by 10.5 centimeters deep would not be acceptable and would be rejected.

Similarly if the advertisement is to carry an image of, say, a house or a car for sale, the advertiser will be forced to provide an image that is the correct file format and is not too large or small in terms of file size. It is very easy to generate a huge file containing a digital image the quality of which will be lost in the rendition within the printed product. There is no value in accepting a huge file in the server or on the network when that file's content can never be fully utilized. Such a file would be rejected upon upload with an appropriate message.

Services like AdCompose and another known as AdOnline allow the advertiser to deal directly with the publisher. Previous interaction may have been via agencies or other third parties that claim a commission on the interaction.

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"Advertising revenues currently account for approximately 80 percent of a newspaper's revenues and take 40 to 60 percent of its space. Given the size restrictions of a computer screen, more imagination must be used in the design and presentation of ads used in electronic news delivery systems" (Shepherd, Watters, & Burkowski, 1997). Services like AdCompose allow the customer to be as creative as possible without necessarily requiring a third party creative agency. A middleman is removed.

Other organizations (typically advertising agency and art houses) that provide regular bulk advertisements with the publisher are now able to interact via a batch interface, or Web service, using the Internet (virtual private network (VPN)) as the conduit. These sorts of Web services are now becoming more prevalent within the publishing industry.

e-Readers

The reader of the e-news site has a different opportunity from that of the reader of conventional, paper-based newsprint. Most news sites allow the reader to customize a portfolio of regular reading. For instance, a reader (who more and more is "known" to the Web site by virtue of a record in an eCRM system) may be able to select a couple of subjective news, business, sports, and lifestyle articles. This allows them to not have to wade through unwanted and uninteresting articles.

Such selections, however, provide a potential advertiser with an opportunity to target particular demographics as identified from the eCRM. A packaged portfolioed reader who has a special interest in sports may be subjected to more sports-related advertisements online rather than business-centered advertisements.

"In its simplest terms, eCRM provides companies with a means to conduct interactive, personalized and relevant communications with customers across both electronic and traditional channels" (Frawley, 2001). It can include call handling, before-sales, and after-sales activities, transaction support as well as many other functions (Deitel et al., 2001).

Objectives of customer relationship management are (Steward & Eugene, 2001):

- Retain existing relationships to grow revenue
- Making use of the integrated system to deliver excellent service
- Encourage and enhance repetition of sales
- Value added and instill loyalty
- Faster and proactive solution strategy

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E-readers of the classified advertisements have the advantage of customizing specific searches of the commodity they are searching — jobs, motors, or even real estate. These searches can be refined to such an extent that alerts can be issued upon a matching entry appearing in the database. These alerts can be issued instantly via SMS or paging service and/or via e-mail.

All editorial material published in the Fairfax press and online is available via a search engine from the various masthead Web sites, such as smh.com.au, or theage.com.au. Each publication contributes to the same group database. Web surfers are provided with the headline and a brief introduction for the item. If interested, they may select a viewing of the required document but will first have to join Fairfax Digital (Fairfax Online membership). They are then required to sign up for a credit amount (minimum $11, a GST friendly number) from which each selected article's cost will be taken. This is a standard online business alliance with the credit-card agencies and hence the banks.

Fairfax has had to be very conscious of the ability and experience of the online customer, whether they are advertisers or readers. The level of skills of these customers range from beginners to experts, and the Web screens must be designed to cater for this range.

A publishing organization like Fairfax, which prides itself on its neutral stance on general issues, must also be very careful when it ventures into global information systems that can be, and often are, accessed by international individuals. For example, Web pages carrying news content and or advertisements must be carefully screened for sensitive or offensive information, images, or text to ensure that is does not offend certain cultures and also individual sensitivities. It is a financial folly to lose a customer, reader, or advertiser simply because of ignorance of a cultural or social issue. Thus for organizations like Fairfax treading the path of e-publishing, it is crucial not to offend or overlook customer segments within the broader internal and international community. Furthermore Fairfax needs to consider the following issues with respect to its e-readers:

Fairfax can no longer use the luxury of taking down a Web site for maintenance in the early hours of the morning, as the number of expatriate readers in places New York and London are demanding the smh.com.au web site be available to them in their business hours.

Fairfax must be careful to not publish political material that would suggest a particular party preference. This could repel readers and advertisers if the published material was deemed to be supporting one political party over another.

Even more significant these days are the possible religious impact aspect of e-publishing. Typically Fairfax's low weeks for publishing both printed and online material is over the Easter and Christmas periods. Should demand from non-Christian groups require this situation to change, and so long as the commercial

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opportunity exists, then the printed and electronic content may be made more available during these Christian holidays.

e-Employee

Recently Fairfax committed to an upgrade of the six-year-old PeopleSoft ERP system. One of the reasons for this upgrade was to enhance the ability of its employees to deal with customers as well as their own internal HR requirements. One of the requirements of committing to the new version is that it had to be accessible to the staff via a Web browser rather than the more conventional "fat" client. The technologies for GIS ensured that this is a much simpler and therefore less-expensive implementation over the current fat client interface. This is resulting in "globalization" of its employees as well.

Fairfax now has an internal policy that, where possible and practicable, any new systems or software should be available to its users via a Web browser. This type of interface is not only valuable to its users but also has benefits from the aspect of administration and installation. Typically no physical desktop installation is required at all as the user simply needs to enter a new URL into the browser. This address is then saved to the favorites list within that browser. The cost savings of not having to have a help desk member or a technical person visit a desktop to install new software or upgrades is substantially significant.

Many organizations are seeing evidence of changing job roles, and the job definitions are becoming less clear. More and more people are becoming knowledge workers and are able to fulfil different roles within organizations thanks to the supporting technology offered by the organization. There seems to be an expectation that employees in jobs that might not usually have much association with IT now must be literate in IT matters. They must be able to "talk-the-IT-talk." To this end it is evident that many graduates from tertiary and higher education are now emerging from their courses with dual degrees — IT and accounting, IT and commerce, IT and law, engineering and IT. As global information systems spread into all areas of business, the expectation of employees to be familiar with IT concepts and principles has grown. One only needs to look at the IT content of MBA courses offered by nearly all the leading tertiary institutions to determine how closely IT and business are now linked.

Employees are often no longer content to stay in the same organization as they once did. Few people expect to be in a job for life these days. Typically job tenures are shortening in most industries. This is one reason why it is important for an organization to have simple and consistent internal systems that do not require employees to have extended training classes and that the employee could expect to be able to use intuitively.

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Many employees require the ability to telecommute. This is often due to lifestyle options, heath, and or family requirements. Global information systems allow staff to work from home and still have access to a complete suite of applications and services.

E-Publishing Business Analysis

Prior to any organization launching into a new e-publishing initiative, preparatory investigative work must be completed. This requires the organization to identify areas that need to be assessed in order to identify the ability of the organization to undertake an electronic transformation project. Questions that need to be asked to determine this status include (but are not limited to):

- Is the current technology suitable or powerful enough for a new e-publishing project?
- Is the staff skilled enough?
- Is there sufficient budget?
- Is there sufficient time?

Many of these issues can be summarized and assessed via a capability evaluation process as discussed next.

The capability evaluation is the process where an organization is analyzed to determine if there are sufficient resources in all the required areas to allow an initiative or project to proceed and reach a successful conclusion. Areas such as staff numbers with appropriate skills, technology base, budget, time constraints, and other business priorities combine to provide the organization with a set of parameters that would help determine if the organization is capable of successfully completing a new project. The existing business is dissected in order to clearly understand how it works, and then there is an effort to identify what the future capabilities might be.

Often the organization will need to form an alliance to complete a new initiative. There are two types of alliances relevant to this situation: vertical and horizontal alliances.

Vertical Alliances

A vertical alliance is defined as partnering with companies in the same industry or different stages in the supply chain (Thompson & Strickland, 2001). In the

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publishing industry, for example, partnering with other publishers, paper manufacturers, multimedia specialists, or Internet service providers would be considered as vertical alliance. The aim of this is to strengthen the publishing company's competitive advantage through the alliance.

The idea of one publishing company aligning with another is quite interesting and perhaps unexpected. But it is not just an idea. There are a couple of examples already involving both Fairfax and News Limited in Sydney and Melbourne, where joint ventures or vertical alliances already exist.

Project "Connect" is where all major suburban newsagents, common to both Fairfax and News Ltd, are able to provide the two publishers with updated information relevant to subscribers and readers via a Web service. For instance, the Web site allows the newsagent to log in securely and enters details such as the number of each product (for example, SMH or Telegraph) required in the following days or weeks. Similarly they can enter the number of returns[1] for each publication. This information is then automatically and in real time fed into the back-end business systems of each of the major publishers. As this Web service currently caters for the majority of all newspaper readers in both Sydney and Melbourne, the technology and systems are fast becoming a standard for the industry to which the newspaper association has to conform. This is an example of where dominant players in an industry can force de facto standards on others in the industry.

Each day, after publication of the major newspapers of the two dominant publishers (again, Fairfax and News Ltd.), the published articles are exchanged and loaded into the private electronic archives of each organization at no cost to either. This provides the research staff from each organization a rich and up-to-date source of information on every article published in the major press. This resource is unavailable to anyone but the staff within the two organizations.

Although it has not happened yet, it is not inconceivable that one might be able to construct a Web portfolio where one is able to select a preference of different types of news content from different and competing publishers. Sports might come from the News Ltd stable, local news from the SMH, business news from the Financial Review, and international news from London's Guardian.

A vertical alliance with other similarly focused organizations could assist an organization like Fairfax to achieve even better results from its Web sites. Such an alliance with a radio and or television station would allow textual content to be presented in a more attractive and interactive way. An example would be to illustrate the related articles with audio and video clips (Shepard, 1997). Fairfax has been lobbying the federal government to repeal the current cross-media ownership laws. If this were to happen, Fairfax would be very keen to obtain a majority share in a TV station, free-to-air or even pay TV. This would enable easier, more cost-effective cross publication of information. Nonetheless it has

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technical limitations because the wide bandwidth required for audio and video is not complete. Another example is the use of hypertext within the articles' content. The customers can have an alternative approach of the news: "the hypertext software will allow the consumer to roam at will freely through the daily electronic newspaper" (Elderkin, 1996).

Horizontal Alliances

A horizontal alliance is partnering with a different business type altogether. Such alliances could include various businesses. For instance, Fairfax could partner with a bank(s) to offer electronic commerce service. It could ally with telecommunication companies or advertising companies for mobile commerce services. It could also ally with hotels or tourist agencies to provide travel services. The advantage to this is that Fairfax would be more diversified and can attract customers from different target areas and markets.

If Fairfax were to ally with a bank, it may attract more customers from the regional and outback areas, as banks are pulling out of those isolated locations. As most banks in Australia are promoting e-banking, Fairfax can negotiate with a bank to promote each other through Web sites. For example, banks could put their banner/URL in Fairfax's smh.com.au Web site and vice versa. This can allow customers a new channel to get access to banking services when they are on the Fairfax Web site. Besides banks, Fairfax could ally with TV stations to provide video clips of news for Fairfax's news section in the Web site. Hotels and tourist agencies can provide travel information or discounts on Fairfax's travel Website. The aim is to attract overseas readers.

A classic example of an existing horizontal alliance is that of the SMH and the Australian Stock Exchange (ASX). All company announcements since 1990 are available for search and access via the smh.com.au Web site and the Tradingroom.com.au Web site. Each article viewed costs a preset amount. This revenue is split between the two organizations, Fairfax and the ASX.

These alliances and the publishing business itself function more efficiently if procedures and events happen digitally. The fewer manually processes required, the better for all involved. To this end a digital backbone or digital nervous system must exist.

Digital Nervous Systems

A useful definition of a Digital Nervous System is:

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When thinking and collaboration are significantly assisted by computer technology, you have a digital nervous system. It consists of the advanced digital processes that knowledge workers use to make better decisions (Gates, 1999).

Fairfax has a significant digital nervous system with strengths and weaknesses in some of the 12 major defining areas of a DNS (Gates, B. 1999).

Insistence on e-mail: Even though there are employees who might feel overwhelmed by the volume of e-mail arriving in their accounts each day, they cannot and do not deny that the information exchange is swift, efficient, and usually concise. E-mail has the added benefit of being able to be filed logically in whatever sequences the recipient desires. Fairfax has very little internal or external communication that is not completed or augmented by e-mail. Added to that, at least two of the newspaper production systems have proprietary instant messaging systems.

Trend spotting: All successful organizations are able to monitor their own performance in various areas. This requires various measuring tools and statistics being maintained and regularly analyzed. This process often allows trends, both positive and negative, to be spotted and addressed accordingly. Fairfax utilizes a data warehouse for this purpose and recognizes that it has only scratched the surface of the potential of this database. It will be expanded in the near future.

Use PCs for business analysis: All employees should have access to a PC/workstation that allows access to intranets where various corporate communications can be lodged in a consistent location. All Fairfax staff have access to a PC. Some staff in the more mechanical, industrial areas have access to PC-marts. These PC-marts allow staff who don't need a PC for their day-to-day duties to still use the company services electronically and be accessible electronically.

Use digital tools to create cross-departmental virtual teams: This can be as simple as using video-conferencing to allow staff in remote locations to communicate face to face with colleagues. Additionally there are many digital workspace tools that allow remote or dispersed staff to communicate and collaborate on tasks and projects. Fairfax has digital video conference equipment connections between all the major sites. This equipment is used regularly and with confidence.

Convert every paper process to a digital process: Paper moves slowly. Digital alternatives can be swift and are less likely to be lost. They are usually more accurate, as data can be validated as it is being entered onto electronic forms. Fairfax is in the process of upgrading its main business system, PeopleSoft, to implement much more sophisticated and comprehensive workflow tools.

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Use digital tools to eliminate single-task jobs: This is good for the employee who would otherwise be completing these tasks as it is removing often mundane and repetitious work, and it is good for the organization in that it frees the employee to do other tasks. Fairfax uses a product called BinuScan that allows a digital image to be automatically enhanced according to set parameters for the best rendition in the printed product. This process, once a somewhat mundane and boring task, is now automated and provides excellent results.

Create a digital feedback loop: This allows employees to constructively criticize any part of the business that they might see as inefficient, dangerous, costly, or poorly conceived. Often such feedback loops are associated with rewards that help with staff morale. Fairfax satisfies this requirement by having a regular set of internal surveys, delivered electronically. There is an annual IT survey that solicits opinions on systems and provides extensive options for feedback. Prizes are awarded at random for participation and at least one prize is awarded for the most constructive or useful comment. A more general corporate survey is regularly distributed for staff comments. This, too, is delivered electronically.

Use digital systems to route user complaints: This allows the customer to have direct access to the expert within the organization. The customer and the organization build a closer, stronger relationship if such complaints and the routing and handling of them is done the correct way. Fairfax, for example, provides a service called "Readerlink" that invites any sort of comment, criticism, or praise from the customers to be channeled to the correct internal staff. Readerlink is available via a Fairfax Web site or via e-mail.

Use digital communications to redefine the nature of the business: This suggestion indicates the business should become somewhat of a chameleon in order to present to the customer a best fit. If the customer wants intimacy or an individual to speak with directly, then this should be allowed and catered to, especially if there is a trouble-shooting or problem-solving process to be completed. Alternatively the organization must be able to look as if it has power and strength behind it in order to provide the customer with confidence in the organization.

Fairfax's internally developed classified advertising tool — AdOnline — fits this category. This tool allows contracted advertisers to enter their own advertisements into the backend publishing systems via a Web interface. The advertiser can complete this task whenever it suites it (obviously subject to press deadlines). It does not need to discuss the details with any internal Fairfax contact centre staff. It will receive a real-time quote for the ad, and it will receive an image preview of what the ad will look like when it goes to press.

Trade information for time: Where possible an organization should deal with suppliers electronically. This saves time and costs. An example of this at Fairfax is the way staff air travel and accommodation is booked. Fairfax has a relationship with an online travel organization called TQ3. TQ3 allows authorized

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Fairfax staff to book flights and accommodations into its database through the use of a web service. Fairfax is given discounts for the amount of business it generates, and it can do this business when it suits it.

Use digital delivery of sales and services to eliminate the middle man: Kerry Packer, Australia's richest man, uttered the phrase that "Internet will kill the middleman" (Crowe, 1999, p. 15). Eliminating the middle man is another way of bringing the customer closer to the business and reducing costs for the customer or redirecting the revenue from the middle man to the organization or removing the middle man's costs altogether, thereby reducing the cost to the customer. Fairfax's publications are all available online via each of the masthead Web sites. Many customers choose to view their daily news via these Web sites rather than using the conventional newsprint delivery method. This removes the middle man issue of printing and delivery, both of which constitute a substantial cost effort.

Use digital tools to allow customers to solve problems for themselves: Some customers would prefer to help themselves if they encounter problems or need to make inquiries of the business. Facilitating this service is often as simple as providing online answers to a set of frequently asked questions. More substantial solutions to these sorts of issues provide online knowledge-based systems that allow people to search for information or likely solutions. Fairfax provides substantial details on Web sites that prescribe how advertisements should be provided to both print and online publications. The specifications, deadlines, delivery methods, general rules, and details are often used by advertisers wishing to ensure their ad image specifications are correct prior to uploading.

Requirements Modeling

The process of requirements modeling would normally take place in the early stages of an e-business initiative. It attempts to identify every e-business-related issue that can be imagined within the project. The requirements modeling activities will be grouped into three areas: system requirements, integration requirements, and modeling requirements.

System requirements

This will be further broken into three logical tiers:

Front end – the Web level.

Middle tier – internal systems and business rules.

Backend – supporting database infrastructure.

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Integration Requirements

The organization must question what integration with other systems might be required if new initiatives are to proceed. How will legacy systems be able to integrate with the new front end? What limitations will exist with such interfaces? Can XML be generated from these systems?

Modeling Requirements

Requirements modeling require significant attention when applied to e-businesses ventures. Very often new Web sites are required to interface with back-office systems, many of which are legacy systems that are too expensive (and perhaps too good) to replace just to be able to have elegant interfaces. Software bridges and special interfaces are often required to move data into and out of these systems.

Often an e-business will grow from a brochure-ware Web site that was more popular than expected. A more substantial e-business is built around that informative Web site that may not have been as well-designed or planned as if the who e-business initiative commenced without the initial Web site in place.

Sometimes it may be better to not interface with these core business systems directly due to security, performance, or other reasons. Alternatives to this situation could see an organization take daily extracts from the legacy systems and pass them across to the new e-business site, where it can be accessed directly by the Web software. This effectively is a rework of the business process but may be suitable and appropriate depending on how valuable and sensitive the legacy system data might be.

The new e-business Web site must be easily navigable by the users. The organization does not want the customer calling the help desk asking questions on how to use the Web site. This would be expensive and would defeat the purpose of a self-serving e-business.

Project requirements are now often determined by the using the Unified Modeling Language (UML). UML is being utilized in the Fairfax Digital online department of Fairfax. It allows the project design staff to walk through the entire business process in relation to the project and detail how information and events will collaborate.

Legal, security, and taxation issues must be considered when the e-business service is being planned. This task must not be underestimated when the organization considers how many potential international customers might use the Web site, all of whom may come from countries where the legal or tax systems are different. How much variety and international focus should the e-business have designed into it with the expectation of a large variety of users?

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The organization building the e-business must allow the customer to trace transactions as far as possible in the process. This becomes especially important if the customer is required to use credit card details to purchase a good or service. The customer will demand transparency in the credit card dealings. This transparency must be at a very low level. What is the situation if the customer enters all their credit card details into a Web page and submits the details for purchase? At the instance immediately after the "SUBMIT" or "OK" button is clicked, the connection to the Internet or Web site is broken. In what state is that transaction? The customer will require atomicity of transactions. What is the barest minimum of significant data that needs to be sent over the Internet in order to complete the transaction?

There is no value in planning a sophisticated Web site if a majority of users have old or out-of-date browsers or PCs from which they run. The organization building the Web site must be conscious of the lowest common browser level that might be used by clients visiting that Web site.

Successful e-business initiatives will require the organization to consider a combination of business process re-engineering, e-commerce transaction awareness, and capability and appropriate supporting technology underlying it.

E-Publishing Technical Analysis

Technical System Characteristics

The technology and software behind a modern, progressive, and competitive e-publishing organization like Fairfax must exhibit certain characteristics in order to remain successful. Resulting from successful application of the concept of GIS, Fairfax business and systems already exhibit some of the desired technical features of a global business as discussed below:

- Scalability: The system architecture to sustain long-term growth, in terms of:
  - the expansion of services offered,
  - growth in the number of users, and
  - natural and planned increase of information source (data).

A recent Fairfax internal example of this scalable architecture is that of the new implementation of the PeopleSoft financial modules that are now all thin-client or browser-based. This implementation represents a major shift from the single-server IBM mainframe environment to a WINTEL-based server farm of more

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than 40 HP blade servers. This farm can be added to at anytime if and when an extra resource is required without disruption to the operation of the system. Similar architecture is used on many of the online portals.

Adaptability: The technology must enable the organization to upgrade and integrate its enterprise resources and customer relationship management systems. And if organizations like Fairfax seek to form partnerships with other companies, the system integration involved across multiple boundaries and the technology used should not impose a technical bottleneck.

The adaptability of the IT services within the organisation is what will allow it to survive sudden changes in the market and with the competition. Some of the mechanisms that Fairfax uses to allow its core business systems to be adaptable and agile are tools like application programming interfaces (APIs) and web services. APIs provide a consistent set of software interfaces allowing software modules to communicate with the business system as if it were being done via the primary interface. The API can limit the scope and range of software requests that may be made, thereby ensuring the system is never overloaded or heavy system resource requests cannot be made. Some of the core business system packages have their own APIs from the vendor. Two such examples are the APIs from ATEX, vendors of the primary editorial system. The other heavily used API comes as an integral part of the system from net-linx, vendors of the system used for classified advertising at the Sydney Morning Herald and the Newcastle Herald.

Other internal systems have had tailor-made APIs constructed for them by internal IT development staff. Naturally other tools such as the common data definition language of XML allow a more consistent understanding of data and, as a result, faster-to-market IT initiatives.

Availability: The systems must be capable of providing a 24 x 7 x 360^0 service to customers, which is essential to serve users on the global platform. The organisation has to be aware that its new e-customers will be online on a 24 x 7 x 360° basis, which means that there will be customers connected at any time, anywhere in the world to read news and use various e-services. Their expectations or interests in Fairfax's content and services might vary depending on their profile. Fairfax has to be aware of who its e-customers are and what kind of specific new e-services to offer them.

Currently, and for many years past, the standard mechanism for online authorization of credit card payments has been based on a system developed internally at Fairfax. All departments that allow customers to purchase goods from Fairfax (advertising, circulation, subscriptions, and online), share the same credit card processing system. It currently exists and was built on the IBM mainframe. By its inherent nature this environment is regularly taken down for maintenance and reorganizations. This regular maintenance is for two to three minutes every day,

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20 to 30 minutes every weekend and two to three hours once a month. Until the online division began processing credit card transactions at all hours of the day, this IBM mainframe-based availability was perfectly acceptable with the business. Most conventional business transactions took place during business hours.

The software development department of Fairfax is now required to provide an alternate solution to the credit card processing system on an environment other than that of the mainframe that will NOT require regular downtime for maintenance. The solution is not yet determined.

Compatibility: Technologies used must be "highly" compatible with the competitors' and the potential partners', as well as being in line with the development of newer technologies. For example, XML and MQ-Message are some of the increasingly popular information-sharing mechanisms in the information industry. Attention must be paid to the newly published NewsML specification from International Press Telecommunications Council. The MQ-Series messaging mechanism is being used to guarantee message exchange between some of the conventional publishing and Fairfax Digital systems. The MQ-Series message exchange protocol is exchanging XML-based packets of data. Where ever possible and practical Fairfax will employ XML as the standard data definition both internally and externally when dealing with partner and client organizations and their systems. Fortunately it seems that much of the publishing industry is quickly adopting XML as the data definition language of choice.

Reliability: Systems must be reliable and available at all times.

The nature of the conventional publishing business requires the major production systems to be available 24 x 7x 360^0. There are few periods through the year when the printed products do not publish. In fact it is only Christmas Day and any Sunday that the Sydney Morning Herald does not publish. To ensure the production systems that are used to build these products are constantly available, major disciplines are required to ensure that they are kept in perfect working order.

Change control is paramount. Software or system changes must not be promoted to production until it has been thoroughly tested and signed off on by the relevant areas of the business.

Business continuity and disaster recovery procedures and systems are now in place and are tested regularly.

All systems require some level of maintenance, but the production systems' maintenance and testing are carefully planned during less-disruptive periods like Easter and Christmas.

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Methodologies and Processes

Added to these system characteristics, any projects or new IT initiatives within the enterprise that require technology applications must adhere to certain methodological and procedural requirements. Some time ago Fairfax adopted the IT Information Library (ITIL) standard that was formulated by the British government in the 1980s. Methodologies like ITIL allow an organisation to have a consistent approach to projects and operations and will achieve a level of confidence in approaching new projects knowing that methodologies employed have produced successful results in the past. Such project requirements fall into the following categories:

- Scope definition
- Requirements engineering
- Scalable architecture
- Client/user experience
- Project and resource management
- Change management and project control
- Security
- Quality assurance
- Change control
- Risk management
- Documentation, training, and support

Relevant XML

As well as general approaches to projects such as a base methodology, there are new software products that are becoming de facto standards as well as ubiquitous in the online domain. Tools such as XML, MQ-Series, and UML are becoming commonplace in most online organizations (Unhelkar, 2003a).

MQ-Series and XML together with an SQL database are all used in the unique project created by Fairfax called AdOnline. This allows SMH and Age classified account customers to enter advertisements directly into the backend publishing systems, where their cost is calculated by the actual publishing system's costing engines. This is a true win-win example of an extranet. The advertiser not only enters the advertisement at a time that suites it (prior to publication deadline of course) but it also gets a guaranteed, real-time summary and break-down of the ad cost as well as an image preview of how the ad will look in the printed product.

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The benefit of this project to the publisher is that there are significant cost savings through fewer staff in the call centre. More than 40% of all classified advertising in both the SMH and the Age is entered into the publishing systems via this unique Web initiative, and the uptake is still growing.

AdOnline is also providing another, unexpected benefit for Fairfax. In the event of a disaster that caused a lockout of staff from the major contact centre, the staff would be able to log on to the backend system from home via the AdOnline interface. This distributed access potentially overcomes the issue of a central contact centre being a business continuity risk.

Roadmap Process of Transition to New Business Scenario

Having described a global e-publishing organization's business and technologies, it is now important to consider the process of transitioning to this global organization. If an organisation is to successfully transit from a conventional business to an e-business, it will require a roadmap or plan for this process. According to Kalakota and Robinson, in e-business (Addison-Wesley, 1999), there are four major areas in this transition that must be understood and implemented. They are:

Capability Evaluation

Most business initiatives at Fairfax requiring IT involvement and support usually have some interaction with the online Web sites. While Fairfax was (and to an extent still is) experimenting with the best way to arrange the online business as a separate business entity from the conventional print business, the conventional business section's IT department realized that a group of IT people needed to be hired to ensure there was always a smooth passage from the online initiative and the standard conventional business. This new group of IT people is the e-commerce development team and reports to the group software development manager. This saw Fairfax armed with a small group of IT people skilled in the areas of Web development and interface creation.

As well ensuring there is adequate and appropriate IT staff capable of transitioning into the e-publishing area, there is also a definite change in the technology that is being employed for such initiatives. Fairfax is standardizing MS-SQL databases for all Web servers and Web-accessed databases. Typically these databases are on a WINTEL platform. This is a deviation from earlier UNIX/Oracle-based platforms or even IBM mainframe, DB2-based systems. Blade servers have become the standard server within the online environment. It

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remains to be seen how well LINUX is adopted, but its price and reliability will see it continuing to apply constant pressure on the Microsoft platform within Fairfax.

Knowledge Building

Having "dissected" the business in the previous activity of capability evaluation, one would follow that with the major activity of "knowledge building." This would include the analysis and modeling of the potential e-customer, relationships with customer, technology trends affecting the business, supply, and purchasing chain trends affecting the business. Through this process it may be possible for the organisation to identify potential opportunities. An example of this activity within Fairfax was the investigation carried out to determine what percentage of the commercial account-based real estate agents who regularly purchase advertisements in the SMH are actually online in their organisation. If the proportion of these customers was high enough, then it would be worthwhile for Fairfax to train them in the use of the Web-based AdOnline advertising tool.

E-Business Design

The organisation must design the e-business in such a way as to take best advantage of the digital capabilities at the organisation's disposal. What extra services can the organisation offer to the customer, or potential customer, that they currently do not have access to? Is the new service a possible "category killer" like Fairfax's AdOnline? Are all the possible transaction types that any customer might require available from this e-business offering? Is all the information that any customer might require in order to do business with the organisation available on the new Web service? Are there automatic links to the supply chain should the amount of business require fast and automatic ordering of goods?

The organisation must be able to focus the Web site to the customers in order to make them feel at home. Fairfax's AdOnline service presents the identified customers with their own logo or branding once they are on the Web site.

The Web site must have as much self-help for the customers as is necessary. The capability of the customer may be anywhere on the scale from novice to expert.

The organisation commencing the e-business initiative also must keep best practice ideas in mind when designing the Web service. The service should:

- Entice customers to register (for example, my.yahoo.com, f2.com.au) – provide access to free services, customized layout, and so forth.

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- Recognize returning customers and customer retention.
- Organize site by customer needs (for example, smh.com.au, ninemsn.com.au, ecluboz.com.au).
- Provide a customer service knowledge base (for example, cisco.com, hp.com).
- Provide individualization (for example, Yahoo, Excite, fidelity, homepath.com.au).
- Allow customers to customize the look and feel of the site to suit their own tastes and needs (for example, Excite, Yahoo.com.au).

Conversion (Go-live)

The actual point of conversion, or "go-live," of the new e-business must be planned to ensure all aspects of the enterprise work as expected. This will ensure the organisation is not left in an embarrassing situation where much money and fanfare has been spent on promotion and marketing of the new system and service only to find the Web site and services are not ready, or worse, are faulty. A good example of this situation was the launch of the David Jones web site in the late '90s. It was plagued by technical problems and underestimations of traffic. The site was decommissioned and later rebuilt.

Legal and Security Issues

The most common and disruptive security problem experienced by globalized organizations, such as Fairfax and indeed many other high-profile organizations currently, is that of the computer virus. Network interruptions, denial of service, and destruction of files and other data have all been experienced at some stage within the last 12 months. This is despite what might be considered a tough policy on connection of foreign equipment and stringent, up-to-date firewall policies.

The edition of the Australian Financial Review on Friday, November 21, 2003, was almost abandoned as a result of a denial-of-service (Dos) attack from a virus on an SQL server. It was the result of a procedure/policy not being followed within the organization, in that an appropriate patch was not applied to a WINTEL server running SQL when it should have been. Fortunately this edition was saved at the last minute, thereby avoiding a costly and embarrassing blunder. There was a benefit from this incident, however. Fairfax immediately launched a review of the internal system security policies and procedures. Some were found to be lax or no longer appropriate and were quickly updated. Questions arose, like "should corporate floppy drives and CD drives be disabled" in order to prevent viruses coming into the corporate network? Fairfax had recent

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examples of incidents such as a piece if legitimate software being delivered on a CD containing a virus. Most .EXE files are already prevented from entering the corporate environment but not .EXEs downloaded from the Web. Where should the line be drawn?

For a significant publisher like Fairfax there is nothing new to legal issues with published content. Libel is not a stranger to Fairfax. The advent of the online era has provided new ground for legal issues that embroil the company. In May 2003 Fairfax first learned of a company that was trying to patent a Web service in this country. This patent was initially considered insignificant until the patent owners were successfully granted the patent in New Zealand. The Web service being patented was that of construction of display advertisements via templates held within a Web page. Ads created from these templates are then pushed to a publishing company for appearance in either a printed or online publication. Fairfax had been developing web service products that effectively did those tasks (AdCompose and AdOnline, described earlier). However the patent application predates the Fairfax tools. If successful, the patent owners could potentially sue Fairfax for all the profits Fairfax may have made with the use of its own product since the date of the patent reference.

"Copyright is a property right which arises automatically on the creation of various categories of work, and protects the rights and interests of the creator of literary, dramatic, musical, and artistic works, sound recordings, films, broadcasts, and cable programs and the typographical arrangements of published editions." (Pedley, 2000)

A few years ago Fairfax had to negotiate various enterprise bargaining agreements (EBAs) with the journalists who are members of the Media, Entertainment and Arts Alliance (MEAA) union. As more and more articles published in the conventional publications found their way onto the Fairfax news portals (www.smh.com.au, www.afr.com.au, and www.theage.com.au), the authors demanded further remuneration for the wider publishing of such articles. Fairfax was still able to gain copyright of these articles published on the Web sites after the EBAs were finalized.

Change Management

One of the significant factors influencing the success of all e-transformations, and particularly in the publishing domain, is change management. Change management, in terms of customers and employees, as well as business structures, software, and systems, requires a detailed process.

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Uncontrolled system changes are dangerous to the business; it can cause revenue loss, customer loss, and an embarrassing loss of face. Certain rules and protocols need to be adhered to to ensure that the online service is not disrupted unexpectedly. The following procedures are part of the Fairfax system/software change management requirements.

Systems are not to be changed in any way during the known busiest periods. For instance, the systems supporting the printed products must not be updated on Thursday or Friday. The online systems are not to have structural or system changes between 8:30 a.m. and 10:00 a.m. E.S.T., when most people commence browsing the Internet. Naturally this is a little irrelevant, as the Internet doesn't really recognize time, but the majority of the hits to the Web sites are from local users.

Formal notification must be made to the relevant user communities at least one day prior to the change taking place.

Clear and simple back-out procedures must be available and ready to be implemented should it be necessary.

A simple and swift test plan must be available and executed on the production system immediately after the change has been made. This gives the business a chance of backing out should a bug be found prior to any real users accessing the system.

No production updates are to be completed without the signoff of the relevant business representative

The business auditors insist on a trail of change request documents, particularly the initial request for the change.

Evidence of satisfactory pre-promotion testing must be available.

Scope creep must be closely monitored. Changes can be made to project scope providing all interested parties are aware of the change and understand what the implications of that change are.

There must be a process and method for the business to formally accept the change that has been made, both prior to the change being implemented into the production environment and then again after it is in the production environment.

An e-publishing organisation like Fairfax employs a method of regularly reviewing various new online services to ensure they are working as planned and that there are no unexpected issues emerging from the initiative. Progress of projects is closely monitored and reported openly.

Many projects within Fairfax, particularly online projects, are audited for quality assurance by external organizations that are able to take a non-aligned, objective view of the project. This may be considered expensive but has proven cost effective in the long term.

The organisation must also have agreement on what formally constitutes the end of a project. This becomes particularly important for specific payment for

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external third parties. A clear and concise definition of the project end must be agreed upon prior to the commencement of the project.

When is the Change Control Process not used?

- The change control process will not be used to report or identify the impact of:
  - Assumptions not remaining valid.
  - Risks that actually occurred.
  - Delays caused by schedule slippage.
  - Variances of actual work effort from estimated effort.

Risk Management

A number of risks are identified in all projects relevant to e-publishing at Fairfax. They must be monitored and managed prudently to reduce, if not eliminate, the likelihood of their occurrence. There are many sorts of risks that an e-publishing organisation like Fairfax could be susceptible to. Everything from malicious hacking, denial of service, disgruntled staff, unreliable power, terrorist attacks, competition undercutting, and changes to government or taxation policy can never be totally ignored.

There are various sorts of risks associated with projects and the on-going business. Some suggestions conclude that it is a simple matter to have adequate insurance to cover an unexpected event. Such insurance could be expensive depending on how long the policy covers the outage. Insurance companies will demand that adequate disaster recovery or, as it is now being referred to, business continuity, is implemented.

An organisation like Fairfax takes great pride in never having missed an edition of the Sydney Morning Herald since it was first published on April 18, 1831. For Fairfax, it is not enough to rely on insurance coverage if a disaster strikes. The corporate expectation is always to produce and publish a fresh edition each day.

Many organizations are outsourcing some part of the business. While this might be financially beneficial in the short term, there may be long-term issues that take the gloss from the exercise. Organizations need to be careful to not find themselves exposed should an offshore service no longer be available due to changes in policy. Some consumer resentment is also obvious when having to deal with offshore call centres.

It is always useful to engage a third-party, independent group to assess the level of risk an organisation or project might have. This could be an expensive operation, but in many instances it is necessary for auditing purposes.

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Enhancement of Back Office

The enhancement of the back office represents a number of services that could be developed to supplement the system and may largely improve the quality of operational control. Moreover it can form a good basis for additional service offerings. These may include:

- Building a content management service to simplify the coordination and development of contents in publishing.
- Developing a knowledge management service to boost the knowledge and "business and technology know-how" of staff, thus supplementing Fairfax's capability in becoming a global information provider on a wider scale.
- Re-engineering back-office systems and processes so as to improve efficiency and reduce cost.

M-Commerce

With the increasing usage of mobile phones, Fairfax could attract a wider customer base by promoting m-commerce. M-commerce initiatives can contribute to customer loyalty and goodwill. Once Fairfax has information on customers' demographics and personal tastes, this information can be used to better service the customer and therefore potentially extract more money from them. Certain news headlines or advertisements can be sent to a customer's mobile phones or personal digital assistant (PDA). In order to do so, content of the article or advertisement has to be in an XML- or WML-based format. This format can enable the transfer of data to mobile phones and PDAs.

A new development was revealed at the October 2003 IFRA conference in Leipzig. This new development, called "e-ink," might be the perfect blend of conventional (printed) newspapers and the more contemporary online method of publishing. A plastic sheet, sized somewhere between A3 and A4, would be connected to the Internet and thence a publisher's Web sites, via your mobile phone. The consumer would connect to his or her favorite news provider(s) and request a download of the current desired news items and/or selection of advertisements. This information would appear as electronic ink on the plastic sheet. The user would be able to move between pages via a virtual button on the e-page. Such a device could be a winner in the world's commuter markets and could be the saviour of the publishers of broadsheet products that are not commuter friendly.

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Other mobile (m-commerce) applications through the classified sections could also be considered in the future for Fairfax. For example, when consulting e-news on a PDA, an e-customer might see an advertisement for a Coca-Cola drink. The customer could potentially be able click on the PDA and directly complete a transaction with the closest Coca-Cola distributor. Telstra and Coca-Cola enabled such kinds of transactions for customers using mobile phones to connect to the Coca-Cola distributor in Central station (The Sydney Morning Herald, 2001).

Using electronic ads that are buttons, timed or activated by the mouse roll over, will enable the system providers, in this case publishers like Fairfax, to track who views advertisements, how often, and for how long (Shepherd et al., 1997). Then they can report the collected information to the advertiser. Fairfax could evaluate the number of "hits" per advertisement and forward them to advertisers. It can also be useful to assess which type of advertising is the most effective.

Conclusion

E-publishing is a fast growing variation on an old industry, not just in Australia but also in many parts of the world, and Fairfax has the advantage of being a mature gatherer, assembler, and disseminator of news and advertisements. Fairfax also has the advantage of being able to leverage the content of the conventional printed product to supplement its online presence, both in editorial and advertising content. Deals are done where advertisers are able to buy advertising in both newsprint and online, thereby accessing a much wider audience or circulation.

Fairfax must recognize that the customer demographic is changing as a result of the Internet and World Wide Web, and those consumers are more and more time-poor. Unless the business can agilely reposition itself and embrace the features of the online world, the competition, which is no longer just the other newspaper in town but any publisher on the Web, will soon take the readers and advertisers away.

The customer is now in the driver's seat more than ever before. Fairfax must be sensitive of the customer's needs and ensure that the customer's experience of Fairfax's online presence is as good as it possibly can be. The online distractions coupled with the time-poor audience is a challenge for any e-publisher but it is also an opportunity to solidify relationships with customers and attract new ones.

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Endnotes

[1] Returns are the number of unsold papers from a given publication date.

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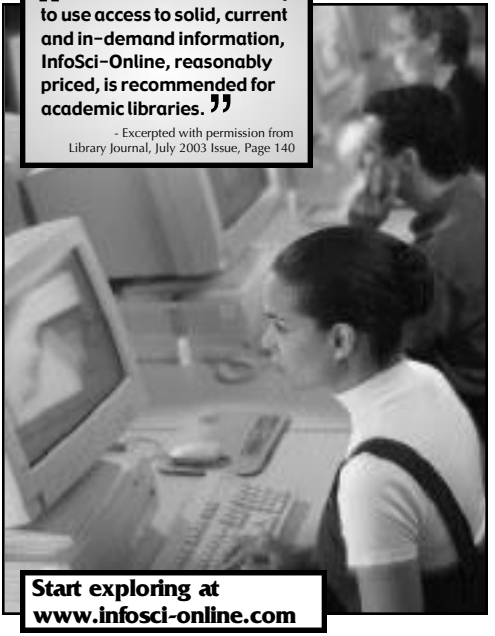

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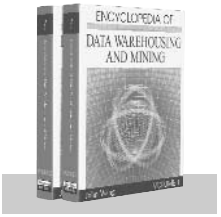

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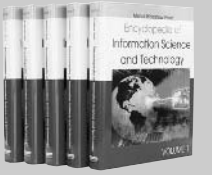

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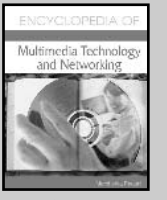

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